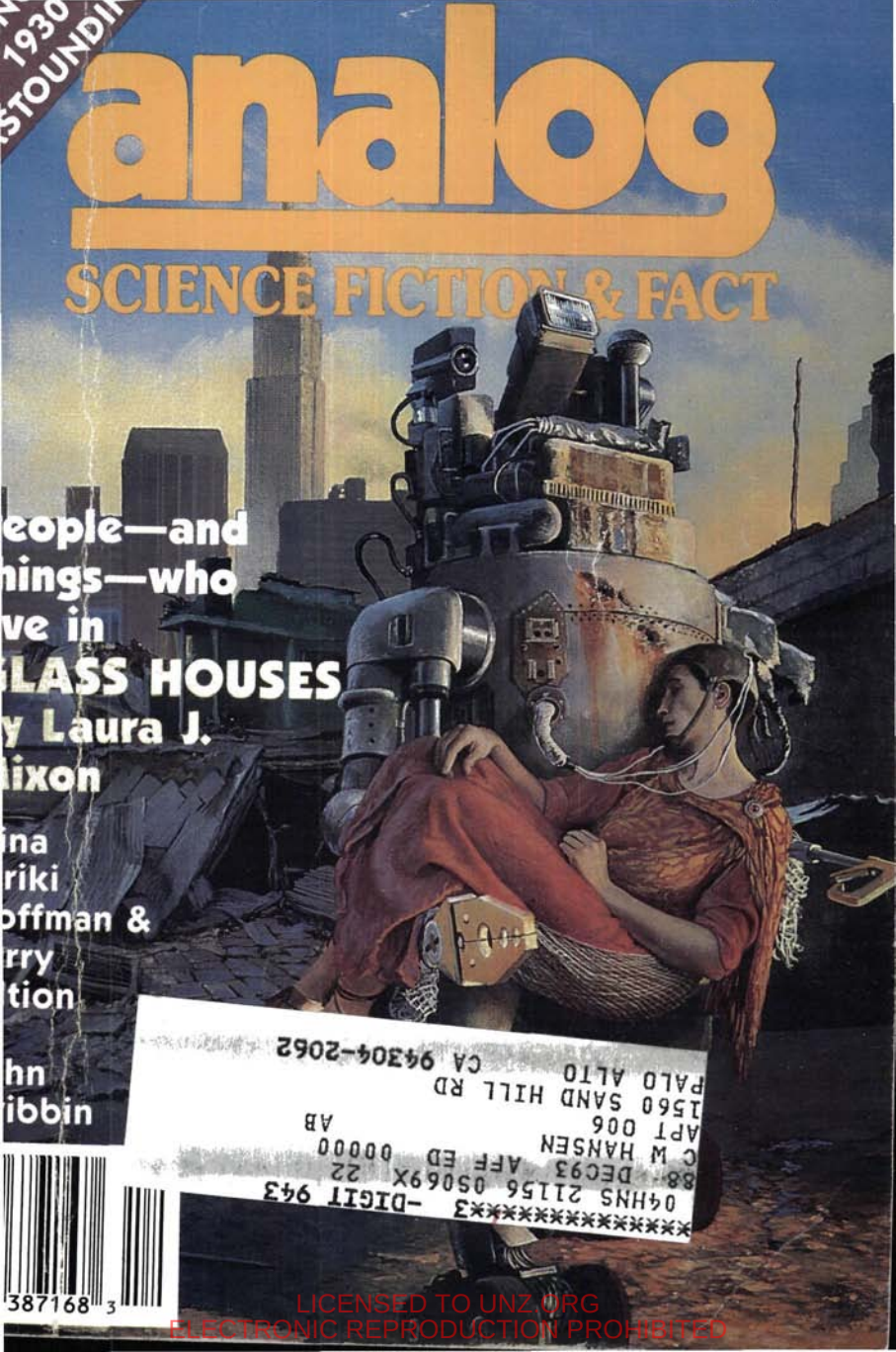

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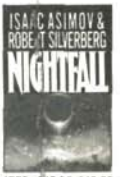

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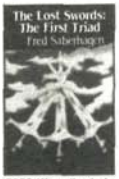

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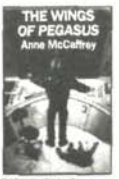

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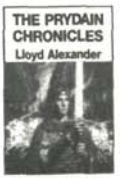

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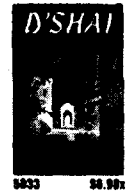

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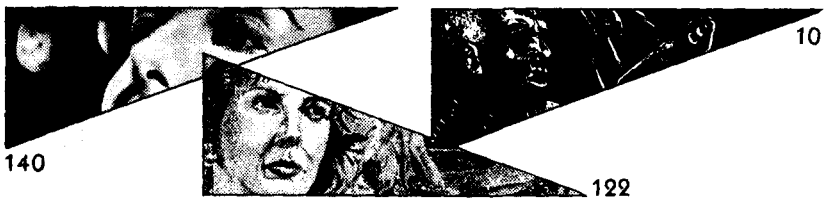

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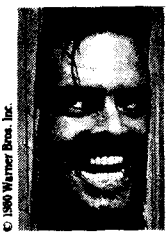

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Editorial

A SPEEDY TRIAL

Stanley Schmidt

If you're looking for humor, the United States Constitution is probably not high on your list of sources. However, there *are* a few laughs in there—not because the founding fathers were trying to be funny, but because times have changed in ways that make it very difficult for the real system to deliver what they promised.

One of my favorites is the beginning of the Sixth Amendment, which states that "In all criminal prosecutions, the accused shall enjoy the right to a speedy and public trial. . . ." If you read newspapers, you may find the very idea of "speedy" and "trial" in the same sentence amusing. It just doesn't happen that way very often. Both criminal and civil cases routinely take months or years to come to trial. The Constitution doesn't explicitly mention speed in connection with civil cases, but surely the parties in *any* legal proceeding would like to get it resolved as quickly as possible—preferably while they're still young enough to enjoy anything they might gain from it. In practice, courts commonly have long backlogs of *both* kinds of cases. I've heard of at least one county which has simply stopped trying civil cases until further notice, in an effort to give itself a fighting chance to catch up on the criminal kind.

Some of the disadvantages of all this are obvious. People who feel that they've been wronged spend years of their lives in a limbo of frustration while waiting for something to be done about it—with no assurance that the outcome will do them any good. An *accurate* resolution becomes less and less likely as witnesses' memories grow dim and cobwebby. Old wounds are kept open and picked at for long periods when the parties would rather be getting on with their lives.

But there's one aspect of the slowness

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of the legal system whose significance hadn't really hit me until I found myself on a jury for a medical malpractice suit involving a patient who had died 11 years earlier. *Eleven years!* (During which, incidentally, one of the several defendants had also died. And as I write this, I still don't know whether the case will ever actually be tried. On the day the long-awaited proceedings were supposed to start, the judge announced after some hours of talks behind closed doors that a "technical difficulty" had come up and the case could not be tried now, after all.) The point that struck me during the jury selection is that while the courts are getting ever slower, technological change is getting ever faster.

And a great many cases are very dependent on the technological context in which the alleged misdeeds were done. When they take years to come to trial, that context can be very different from the one in which the jurors live. Thus, in a case like the one in which I almost took part, one hears lawyers repeatedly exhorting prospective jurors to cast their minds back and try to see the circumstances of the case as they were, say, in the late seventies—while they're actually living in the nineties.

How successful the jurors would be in doing this, I can't say. But their success would be crucial to getting a fair trial—and the medical technology of 1991 is *very* different from that of 1979. It would not be reasonable to expect a doctor to have done something for which he would not have the technology until five years after the patient died. Nor would it be reasonable to let the doctor off the hook because "medical technology was more primitive back then" when in fact he did already have what he needed.

Most jurors, you may argue, are not very familiar with the science or technology of the present or any other period. Does a long delay in getting the trial into court really matter when they'll have to be briefed on all these things as part of the trial?

I think it does. It's true that most jurors will not have a very detailed (or accurate) knowledge of past or present science or technology. But many of them have at least heard of recent developments. Some may have at least a hazy idea of how they work. A few may even be inspired to go to the library and learn something about developments that sound potentially relevant to a case.

In my case, for example, though I never got far enough into it to be able to comment on details, it was at once obvious to me from the little the lawyers revealed during jury selection that computerized axial tomography (the "CAT" scan) would have been an appropriate technique for diagnosis of what the plaintiff claimed was not diagnosed. The central question in a medical malpractice case is: did the medical personnel involved do what they might reasonably have been expected to do under the circumstances?

I strongly suspect that most of the other jurors would at least recognize the phrase "CAT scan," even though most of them would have little or no idea how it worked. I wouldn't be surprised if some of them remembered hearing it in similar contexts often enough to suspect that it was something the doctors should have done. Obviously a key question was: did they?

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A slightly less obvious question was: could they? As soon as I got home from my jury selection session, I looked up CAT. I knew it was a pretty recent development, but I wasn't sure how recent—and that seemed likely to be a crucial element in this trial.

As it turns out, it was borderline. It was invented in the early seventies; but, like any new (and expensive) technology, it took a while to spread. Yes, it was available in the late seventies; but was its availability, or even knowledge of it, sufficiently widespread at that time that the doctors treating this patient should have been expected to use it?

That question, I suspected, was one the jury would have to ponder most carefully. I'm a little afraid that some of them, had the case come to trial, might have been *all* too ready (lawyers' and judges' exhortations notwithstanding) to assume "Of course they should have used it!" simply because it would routinely be used in such a case *now*.

This type of problem—the need to

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Editorial and Advertising: Analog Science Fiction & Fact, 380 Lexington Avenue, New York, NY 10168-0035
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make the jury imagine itself "living in the past"—has probably already become rather common. I can only imagine it getting worse if present trends continue. With courts taking longer and longer to get around to cases, and technologies evolving faster and faster, we are going to see more and more cases in which juries have to imagine themselves living ever *farther* in the past. This can hardly be good for the overall quality of justice.

Is there a solution? An important part of one, at least, might well be the same one which has contributed so much to the improvement of medical methodology in the last couple of decades. Part of the new bag of diagnostic tricks, of course, is new imaging media such as nuclear magnetic resonance and positron emission. But the other key part is the use of *computers* in conjunction with imaging media, both new and old, to allow much more sophisticated *analysis* of images and measurements.

There, too, the problem was one of speed. The CAT scan, for example, was possible *in principle* long before it became a practical tool of medical diagnosis. Its working medium is not something new and exotic to medical practitioners, like antimatter (as in the PET scan), but simply good old X-rays. Doctors have been using X-rays to peek inside the human body for almost a century. The principle which the CAT scan applies to them is essentially simple, old-fashioned mathematics: all you have to do is solve lots of simultaneous equations in lots of unknowns. The problem is that when you have that many equations in that many unknowns, and you have to solve them by hand, both the patient and the doctor will die, of old age if not disease, while you're waiting for the results. Add a computer and you can solve them *now*, in time to put the results to good use.

Sound familiar? What we have now is a legal system that does what needs to be done so slowly that it's falling farther and farther behind present reality. Maybe the time is at hand for lawyers and legislators and judges to start thinking Real Hard about how they, too, can use computers to get rid of all unnecessary delay. They're already using legal databases to speed up searches of law and precedent; but that, I suspect, is the merest beginning. What we really need, at this point, is something a good deal more drastic and imaginative.

It's time, in other words, for a legal analog of a CAT scan. ■

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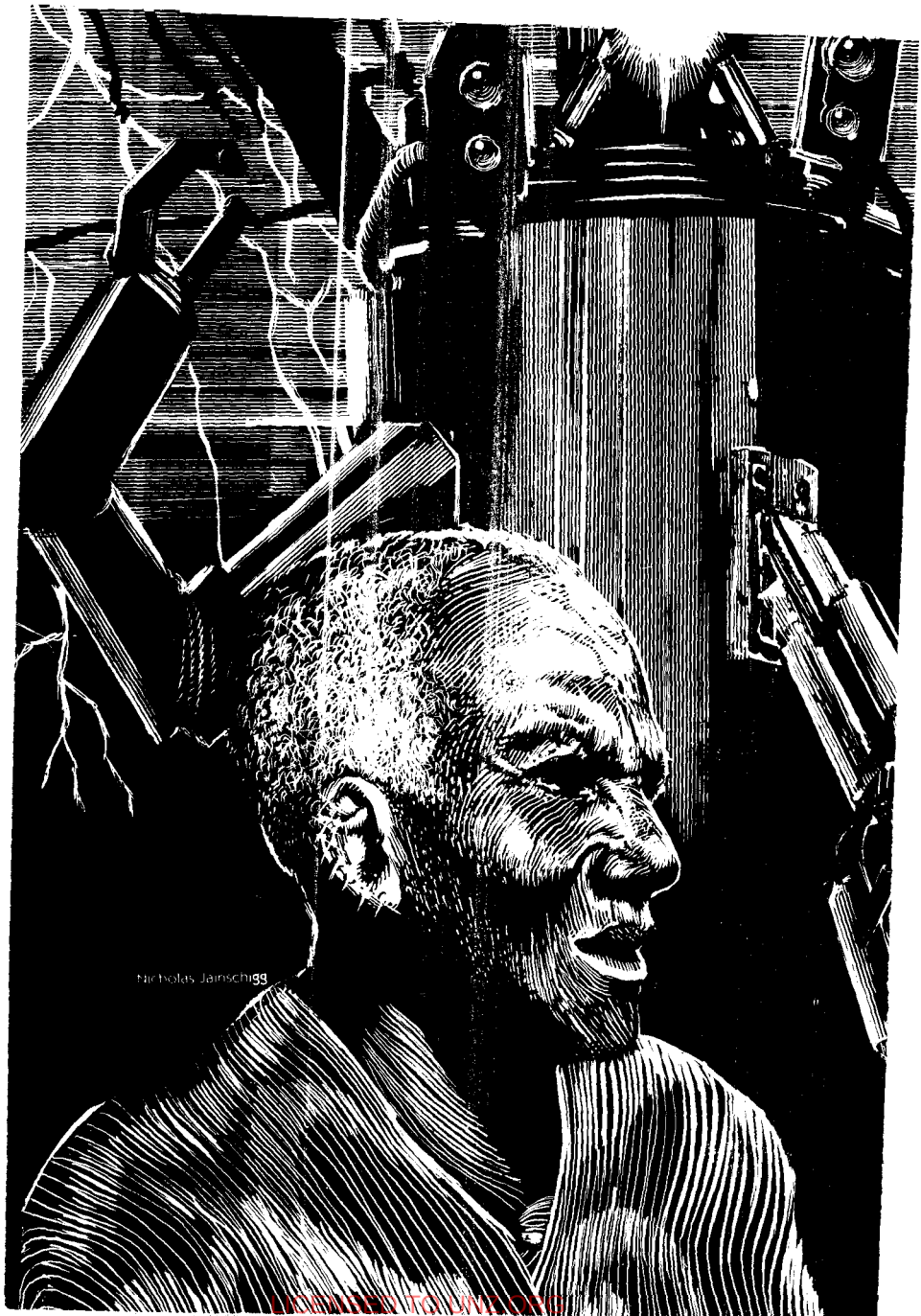

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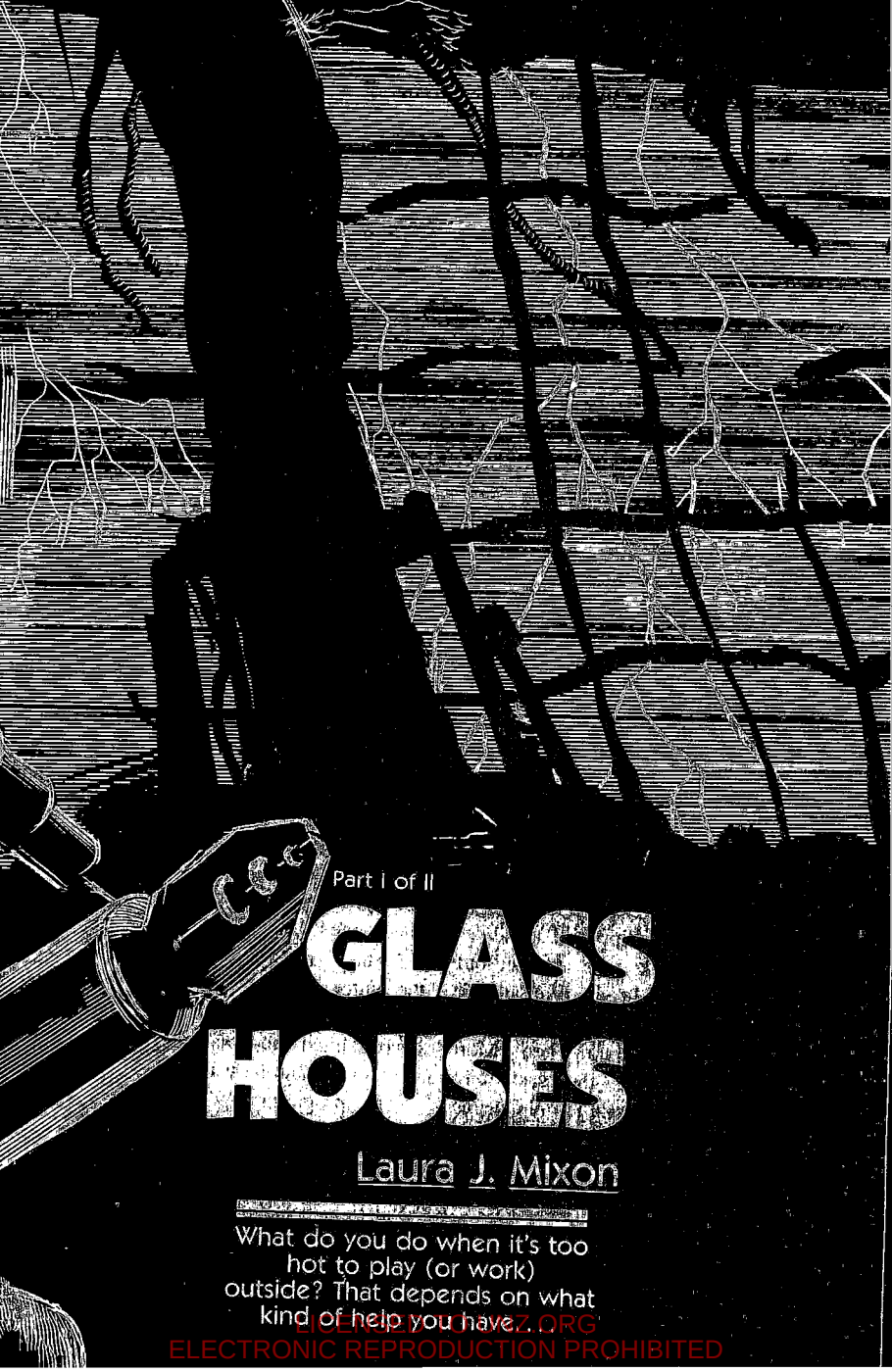

Part I of II

GLASS HOUSES

Laura J. Mixon

What do you do when it's too hot to play (or work) outside? That depends on what kind of help you have.

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Getting Golem up the support structure was slow work with the winds at gale force. I'd hoped to reach the building before Howler Felix hit the coast, but I-Golem wasn't halfway up the scaffolding when hot rain exploded from the low cloud ceiling, pounding Golem's metal shell and blurring my-his vision. The sky spat electricity—mercury-white splashes that strobed the night sky and made the tie cables tremble—and the wind screamed its rage till I had to turn the volume down to keep my eardrums from bursting.

This scavenge couldn't wait for better weather. I'd gotten the job by promising the client I'd recover the salvage before they knocked the building down. And the demolition waldos were due to arrive in the morning.

Golem is oblivious to howler weather. He's too old and stupid to realize he needs to take it slow on a climb; my-his linkware is pretty simple-minded. So I had to use caution for him, my thousand-pound, titanium/metaceramic scrounge, as I piloted him up the tie lines and scaffolding that kept the old Chase Manhattan Bank building from collapsing into the shipping lanes.

Lightning struck: the trashed-out scraper next door lit up like an arc welder's rod and the blast toppled me-Golem. Water rushed up. Then vision and hearing went out—the blast flung me back to my own body in my Queens apartment.

"*Shit.*"

I buried fists in the cushioning gel, lurched up trailing brain web wires, and bashed my forehead on the lower edge of the control panel. With a grunt I blinked away tears, fell back into the gel and rubbed my head. Easy, Ruby, I thought, easy; you won't get back into Golem's head all junked on adrenaline. I took some slow, deep breaths.

The air was damp and smelled of ozone, mold, and Lysol. Felix raged outside my window but didn't sound as angry as it had to me-Golem, downtown. Muted by the walls, the wind rumbled, and machine whispers came from the bank of computers and radio signal amplifiers crammed onto my bookshelves.

The entry light cast a crooked yellow trapezoid across my legs half-buried in the clear gel of the squish-couch and onto the wood floor. Sheer curtains fluttered above the air conditioner and the mobile above it, a plywood pteranodon skeleton in a geodesic bamboo cage, turned slowly on its string. Rodents scratched around in the walls and outside, fists of rain smashed against the double-paned glass.

Then I noticed that Melissa's chair at the foot of her bed was empty.

"Melissa? Are you home?"

Just to check, even though I already knew. My voice carried around corners and echoed back at me. She'd left.

"Shit," I said again, and flicked at the buttons on the panel. A quick scan of Golem's control lights blinking overhead calmed me—his back-up visuals were blank, but he was still functional.

The programming kicked back in then and pulled me back to Golem. I-he looked down into a nasty swirling tumult. His retracted wheel had snagged in a tie cable as he'd pitched over the side, and I-he was hanging upside down like a wrecked car on a magnet, still

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trying to climb. The headlight mounted between his cameras bounced off cables, water, walls, as I-he flailed, twisting, in the wind. Double images danced and whirled in my head while his camera eyes spun independently on their platforms, the program seeking to restore binocular vision.

I swallowed my heart, which had climbed up into my throat, and overrode his climb-and-swing routine. You stupid technoturd. Pathetic monster.

My-his vision—and consequently my stomach—settled. I-he groped back and up for the scaffolding bar. For this scavenge I'd equipped Golem with his largest carrying container, which I call the Coffin because of its size and shape when empty. It's my own design: a metaceramic frame with Tuffnet webbing stretched across it. It can hold up to three and a half cubic yards of material in a variety of shapes and sizes. Unfortunately, the Coffin constrains him; none of his arms could reach far enough backward with their hooks or clamps in the right orientation to grasp the cable. Then a flash of lightning lit up a steel beam directly ahead.

With the caught wheel as a fulcrum, I-he used the blasts of wind and cartwheeled his arms to get myself-him swinging in the right direction. His schwarzenegger arm was equipped with the c-hook; at the apex of the swing I-he got the c-hook around the beam, but his wheel twisted free with the motion and I-he skittered a meter or two down the support beam before the c-hook caught on a rivet. I-he slammed into the beam and hung on for dear livelihood.

A quick systems check: amber needles spread across my-his vision on a cyan grid. No damage. Sturdy Golem. And I could use his telescope arm now.

It took some fumbling to get the fine manipulator off his telescoping extension and the crab claw on. Then I-he extended the arm upward. It telescoped out a good three meters—which was enough, if not for the wind messing up my aim. I-he managed to hook the tie line on the fifth try. Collapsing the telescope extension hauled me-him up—grudgingly, with a mighty groaning of servos. But the servos held.

Useless old thing. Serve you right if you did fall two hundred feet into a flood.

I-he renewed his grip on the tie cable with one of his two finger-handed arms. After securing him I let him dangle like an old gorilla while I-he took a look around. The building was much closer than I'd realized: a looming blackness that filled up my-his sight and, when lightning struck, reflected the storm in its metal struts and broken windows.

DATA SCAVENGE

Bombings had rendered the scraper's interior as fragile as eggshells. Wind howled through the fire-charred rooms and corridors, whipping up devils of dirt, fog, steam, and papers; great holes gaped in the floors and walls. I-Golem shone his light through a hole in the floor and saw splashing water far below. The building trembled and moaned like it was afraid.

The client had given me several electronic maps of the building interior, but it still took hours to navigate through the ruined building and locate the vault. It took maybe another couple of hours to cut into the steel wall and repower

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the archaic lock, break the code, and open the door.

Tens of thousands of laser disks lined the vault's data storage shelves. Many of the disks were damaged and all of them were coated in dust. I-Golem scooped them up with his spatulate arm and then, using his finger-handers—his most humanlike arms with their eight mutually opposable fingers—packed them in gelpaper. Then I-he loaded up the Coffin.

After flipping the Coffin over, I-Golem retracted his wheels, which put me-him on his back, and rolled myself-him over the Coffin's skids. Once upright I checked his macroscale: over two and a half metric tons of goods, the readout said.

Golem's never been rated, so I don't know what ASTM would say his heaviest safe load was. But I'd loaded him this heavy before. It was the weight in combination with howler Felix, the building's condition—and the climb down—that scared me. The walls trembled with each blast of wind and caused chalky plaster to cascade from the ceiling. I had the sense that the walls bowed inward—as if a giant hand were squeezing the building, trying to crush it.

To give Golem added stability I extended and dropped onto the set of smaller, auxiliary wheels at the top of Golem's chassis. Then, keeping close to the edges of rooms, I-he headed outward, and I tried to keep my mind off the blasts of wind, the trembling walls, and the groaning struts.

I EXPERIENCE ENVIE

At first I thought the man was a pile of rubbish, when Golem's light struck him. Then I-Golem saw his eyes glint.

I-Golem rolled forward and reared, Kodiaklike, to get a better view. The glint vanished—the man had closed his eyes, trying to hide. I-Golem activated the speaker.

"Come on out," I-he said, but was drowned out by an explosion of thunder: the building rocked, and plaster fell all around.

"Come on out," I-Golem said again. "I know you're there."

After a pause, some of the layers of paper and sheet rock fell away, and a face peered out at me-Golem, blinking in Golem's spotlight. I-he retracted the auxiliary wheels, dimmed the light, and supplemented my-his vision with the infrared processors.

"What are you doing here?" I-Golem asked.

"I might ask the same of you."

His voice was baritone and melodic with an accent—maybe French or Spanish. The black skin of his face, beaded with sweat, had deep creases. Golem has no tactile temperature sense—only sight with IR, human-range hearing, and a sense of touch which is merely pressure against his metal skin—so it took me a moment to figure out the old man must be sweating from the heat.

His close-cropped hair was so pure a white that it looked like a haze of cotton batting. Enormous diamonds encrusted the curves of his ears and the infrared plume above his head told me he wore a cool suit.

Bif bam pow. My muscles spasmed with the shock like he'd thrown cold water on me, and Golem twitched in sympathy.

"You're an envie!"

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"You needn't worry." He stood, brushing the debris from himself and clutching a brown gelpaper envelope close to his chest like it was something valuable. His cool suit's pattern changed through a series of luminous celtic knots in greys, beiges, and blues on a background of dull umber. Tasteful, if a bit boring. "I shan't report you."

His gaze was as cool and remote as a fish's eyes, but I figured he must be nervous, thinking I was a refugee or a renegade soldier with a stolen waldo.

"I'm licensed, pal. I built this unit myself and he's 100 percent environmentally sound, recycled materials. I have the receipts to prove it. So what are you going to report me for—bad taste?"

He looked me-Golem up and down, but didn't say anything. I doubt he could see well enough, with the light in his eyes, exactly how ugly my Golem was. I half expected him to ask for my license number. But he must have seen enough to figure out Golem wasn't pilfered government issue, because he released a breath and wiped away sweat, and rubbed his haze of hair. The floor trembled beneath a dull rumble. Felix was getting angrier still.

"What are you doing here?" I-Golem asked. "This building is condemned. You could get hurt."

A pained smile came onto his lips. "I assure you, madam, it was never my intent to come here." He limped over to a broken chair propped against a collapsed desk and sat down. Golem's light tracked him. His chest rose and fell, rose and fell. "I was shipwrecked."

"How did you get up here?"

"I climbed."

I couldn't help myself. I laughed. Golem's transmitter broadcasted a metallic ratcheting sound. "In this howler? It's got to be at least a six-pointer."

His eyes glinted at me-Golem again but he stayed silent. Maybe he'd climbed up before the storm had hit; the wind had been churning the water up for a full day ahead of time, so it was possible. But he didn't say so and I could tell I'd annoyed him.

Another spasm rippled through the building—I-Golem rolled sideways and slammed into a wall and the old man toppled with a cry. I-Golem did a drunken little dance till I got his gyros steadied. On the floor, the old man was groaning. He clutched at his leg, the one he'd been limping on.

"My knee . . . I sprained it climbing."

That didn't look so good. We were almost a hundred and fifty feet above the south Manhattan dikes. Even if the weather hadn't been so bad, he couldn't climb down on that leg. And he must weigh over two hundred pounds, with the cool suit on. This could really screw up my scavenge. I sighed.

"Well, come on." I-Golem opened the chest cavity and unfurled a Tuffnet web which I usually used to carry groceries or, occasionally, small scavenges. I'd ridden in it myself and even carried Melissa once. It'd hold a large adult like him, though not comfortably. "We'd better get us both out of here."

He still didn't say anything for a minute. Then, with a grunt, he came to his feet.

"I am indebted to you," he said. He unzipped his cool suit and tucked his

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packet inside, then limped over. I-Golem extended an arm to give him a boost and stretched the netting out with the telescope arm.

Then a blast—thunder at close range—deafened us. A traveling wave surged through the floor and up the walls. I-Golem and the old man went down. A rumbling swelled like the brassy noise of an oncoming train, metal screamed, and several hundred tons of steel, concrete, and plaster collapsed on top of us.

MAN SCAVENGE

I don't know if you've ever had a skyscraper collapse on you. I don't recommend it. The floor gave out under me, cascades of concrete and steel fell onto my head, the screams of the old man filled my ears like someone was murdering him. I remember those few seconds in flashes, like it all happened under strobe lights.

His nearness to me-Golem when the ceiling collapsed was the only thing that kept him from being killed instantly. One of Golem's arms crooked up as I-he toppled over and protected the old man's head and upper chest. The old man probably wished he was dead, though, because a steel beam fell across his abdomen, crushed his internal organs, and let buckets of blood spill into his abdominal cavity.

I know all this because I-Golem wasn't completely disabled in the crush. The same steel beam that fell on the old man lodged against the wall and kept other chunks of mass from destroying Golem's casing. That much I saw before the shock threw me home.

I struggled backward through the gel to the wall, pulled my knees to my chest, and shook. The connector dangled from wires in my hand—I must have pulled it loose from the beanjack at my crown. I wanted to tear the monofilaments right out of my brain. But the old man's screams hung in my ears. He was still alive in there and he wouldn't be for long. No waldo rescue squad, no ambulance would get there in time to save him. Every second counted. So I went back.

Golem's light had gotten smashed and the infrared was useless in that chaos. Systems weren't in great shape—the needles danced like amber pick-up stix in my-Golem's vision. Four of his eight gigacrystals were shattered. Besides the arm immobilized over the old man's head, two limbs were inoperable, crushed. One of his two cameras was out, too. His chassis was severely damaged, with hydraulic pressure dribbling slowly away.

It took only seconds to clear out all the software and fill the remaining four linkware crystals with the bare bones operating system. The gyros told me which way was up, so I knew which way to dig, and I-Golem had length and strength—of the two of Golem's five arms still working, one was his telescope arm and the other his schwarzenegger. I've scavenged under rubble before and I know how to keep an unstable structure from collapsing. Things didn't seem too bad, except for the old man's screaming. So I-Golem got started.

He was crazy with pain. A couple of times I-Golem tried to comfort him but he didn't listen. It finally got to me—I-he yelled at the old man to shut the fuck up and stop feeling sorry for himself.

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Like he didn't have a reason. Christ. I hope he was too far gone to understand.

Anyhow, as the sounds he made got wetter and softer I-Golem dug faster. But he'd been silent for what seemed like days before Golem's hole saw drilled through to air. That gave me-him enough light to see how to work free.

My-Golem's ultrasound filaments fractured the chunk of the concrete that had Golem pinned against the steel beam. Then I-he—ever so carefully! —disconnected the arm that protected the old man's head, rolled myself-Golem all the way onto his back, then retracted the wheels—which lifted me-Golem up and gave the wheels purchase on the floor on either side of the Coffin—and slid myself-him off of it. With some judicious shoving and wedging I-he freed myself-him from the debris. Then I-Golem propped up wreckage, cleared a path for the old man, and slid him free.

I saw then that there was no point in calling an ambulance. His body was already starting to cool. I could have used Golem's IR earlier, after all, and saved myself a lot of work.

How he looked flashes behind my eyes still—the expression he'd died with; the way his crushed arm got left behind; the way his belly had swollen up with blood till it looked like the belly of a tick.

Anyhow, I sat there, squatting inside my battered Golem, and looked at him for a while till I realized that the Sun had risen and was shining into Golem's camera. Beyond the crumbled wall, where another interior room had been last night, was open air and twisted snarls of metal struts. I-Golem caught a glimpse of the Manhattan-Queens ferry moving up the sparkling East River, trailed by crying gulls; last night's gales had softened to a breeze. Streamers of clouds raced inland overhead.

The storm remediation waldos, hundred-foot-tall mantises with blue flashing lights and steel maws, crawled along the streets below, lifting wreckage and debris with their crane arms. They scooped sludge and wood with their dozer mouths, dropping the debris into the massive hoppers they dragged behind.

According to Golem's chronometer, it was almost six. The building wrecker waldos were due—we had to get out.

There wasn't much hope for the scavenged data but I-Golem checked the Coffin anyway. As I'd suspected, they were so much worthless debris, bent and broken.

I-Golem emptied the Coffin, put the old man inside, and slid the Coffin onto Golem's back. Then I-Golem and the old man headed for the nearest support cable. A failed scavenge, a failed rescue, and Melissa off screwing some strange man for spending money in the middle of a hurricane. All in all, not a good night.

POPCORN, BEER, AND COPS IN THE JELLY

No, he didn't tell me who he was—he said he was shipwrecked. I don't know *how he got up there; he said he climbed. No, I can't substantiate my story with Golem's CASC memory because half of his gigacrystals were destroyed and I had to wipe out everything but the essentials to get us down the scaffolding.*

Cops never believe you; they think if

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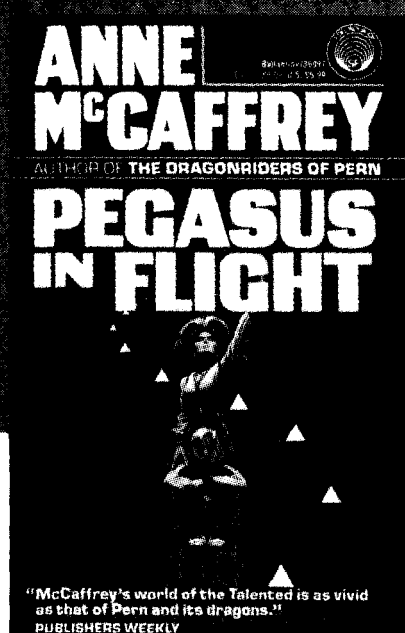
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they stick you in a bare room with metal-reinforced glass on the windows and yell the same question fifty times you'll slip up or crack under the pressure and yell, "All right, I confess. I dropped a skyscraper on the old fart!"

Of course, I had the advantage over them, because they had to crane their necks up all eight feet of Golem to make eye contact. And it was eye contact with a machine, not with me. I'd disconnected from the beanjack and was maintaining contact via the jellovision tube and the radio link, so I could sit drinking a beer and eating plantain chips and watch them from my own comfy squish-couch.

So it'll come as no surprise that they didn't like how I'd piloted my waldo to the station instead of coming in person. But when I pointed out that a) I couldn't very well carry the body myself, and pilot Golem, and report *in corpus*, too, and b) they had my name, license number, personal contact number, debit account numbers, and home address, so I wasn't exactly out of reach, the lieutenant shrugged and dropped the subject.

Golem was probably my best corroboration, though. He looked even more like a heap of junk than usual, and kept dripping hydraulic fluid and dropping bits of metal and metaceramic all over their linoleum—causing the housekeeping robot no end of distress, I'm sure.

They finally went away and left Golem alone. I turned his volume up so I'd know if someone came into the precinct interrogation room and left him dormant while I went to the bathroom. I even had time to pop some popcorn and finish most of another beer.

I came back into the room when the door back at the precinct opened. Beer in hand, I sank into the gel of my couch and flipped a switch on the pull-down control panel to reactivate Golem. His camera swiveled and focused on the woman who moved into range and solidified inside the jello-tube. She must have been a cop but she didn't look like one. She was somewhere in her forties, with dark skin and a large nose, shoulder-length silver hair swept back from her face—and dressed in the baggy veils, wraps, and gauze that *natureils* wear.

I don't know why that shocked me, that a cop could be a *natureil*. You could classify Melissa and me that way, too, but we couldn't afford any part of the envie lifestyle, much less own environment suits, so we didn't exactly have a choice, and she did.

She buried her hands halfway up to the elbows in her baggy pants pockets and looked right up into Golem's camera. I got a chill, like she could see me through the camera.

"I'm Sheila Nanopoulos, the precinct captain." She paused but I didn't fill in the gap, so she continued. "All this questioning might be frustrating for you, Ms. Kubick, after your good faith attempt to rescue Dr. Nasser. But when someone dies under unusual circumstances, we must investigate."

Someone who matters, you mean, I thought; if Melissa or I were killed it'd be days before anyone noticed, and hell would freeze over before anyone would spend money to find out how or why.

"Sure," I said. "I understand that."

"Good. Then I hope you'll understand that since the building where Dr. Nasser died is already under decon-

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struction your—'Golem,' is it?—"

A knot formed in my throat and I went cold all over. I rubbed my arms. "Yes."

"—your Golem is currently the only remaining physical evidence from the scene of Dr. Nasser's death. We'll have to impound your waldo, for a short time, to confirm your story."

"You mean you want to make sure Golem isn't a murder weapon," I said. She gave me a long, appraising look.

"You're not being accused of murder, Ms. Kubick. If everything you told us was true, our forensic work will be simply a formality and your waldo will be returned to you within a day or two. If we find any anomalies, of course, we'll have to investigate further, and it might take longer."

"Oh," I said, and shoved down, hard, on this sudden desire that surged up, to scream in her face, to encircle her wrinkled old throat with Golem's crab claw and choke her.

"Ma'am," I managed, after I'd gotten control of myself, "Golem is my only source of income. I lost tens of thousands of dollars' worth of salvage trying to rescue the old man, and repairing Golem will take almost that much. If you keep him for too long I won't be able to pay my bills and I could end up out on the street."

"We'll be as quick as we can, I assure you. If everything is in order, you should have your Golem back by Friday."

It was Wednesday. Surely I could hold the landlord off for a few more days. Barring "anomalies."

"Thank you, ma'am. I appreciate that." I popped open the control panel on Golem's side. She pulled an override crystal from her pocket and moved out of the range of his damaged vision. Then my jello-tube filled with milky smoke and all the lights on the control panel above eye level went from green and yellow to red. I sat there in the dimness looking at the jello-tube with a warm, sweaty beer in my hand, tears in my eyes, and a knot of futile anger in my belly.

They were going to make me a scapegoat. The old man was an envie, obviously an important one, and I wasn't much higher in status than a refugee. His family was going to be angry, and I was an easy target.

So the fact that on the way to the first precinct station I'd taken his diamonds from his ears and the brown gelpaper envelope from his envie cool suit, made a detour to hide them; and then wiped Golem's memory of it, was probably one of the riskiest things I could ever have done. But the old man's family was too wealthy to miss a few stones, and if I could ride out this storm those diamonds meant Melissa and I would be set for life. Never mind whatever was in that envelope.

FINERY, SPIKES, AND SILENCE

I didn't dare go to the cache. I didn't even feel safe making a run to the corner deli for groceries. I ought to have tuned in to Master Cho's Street-Defense and Aero-Art Exercise Hour and done my usual workout, and then slept; my habit is to work out for an hour when the show comes on at 2:30 P.M. and then shower and sleep from 4:00 or 5:00 P.M. till midnight. That way I can use the cool hours to go out, if the need arises.

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But I was too restless to exercise and not even remotely sleepy. I kept seeing that old man dead, no diamonds in his ears, and I half-expected the police to burst in with a search warrant. So I just sat drinking beer in the apartment till way past my bedtime, not watching jellovision, starting at strange noises until the beer shrank my event horizon to the point where I didn't care, and waited for Melissa to come back.

She came home shortly after 6:00, in her spikes and lace and her sequined finery, looking like absolute hell with her black hair messy and her bird face paint all smudged and sweat-streaked, and flipped on the entry hall light, which hurt my eyes.

"Turn off the goddamn light," I said. She walked past with a bag of groceries and disappeared into the kitchenette, leaving the hall light on.

"Don't be such a bitch."

Pieces of her—elbows, buttocks, feet and calves—moved in and out of view as she put the groceries away, and then I heard her banging around washing dishes. Most of those were mine. But there were only a few, not enough to make a big deal over. Damn it.

She came out with a diet soda under her arm, unwrapping a hero sandwich from its waxed paper. She dug a book out from the shelf, turned on the cone lamp over the lounge lizard at the foot of her bed, kicked off her slip-on pumps, and then unbuckled the spikes from her forearms and dropped them on the floor. Folding her long legs up like pretzel sticks, she stuck her face into the book.

That was it. No *where's Golem?* No *how was your day?* No nothing. And I sat there staring at her with all the words locked in my throat and tried to figure out how things could get so bad between two people who loved each other.

CRAZY MIKEY SCRAPES THE PAINT OFF

Melissa went to bed around 7:30 P.M. She was snoring in minutes. I went to bed about the same time, but couldn't sleep too well; I tossed and turned and watched the blinking neon colors from the street turn the room inside out, back and forth, like a chameleon, in counterpoint to Melissa's snores.

Around 9:00 I got up, peed, and got a glass of water. I sat down on the edge of my bed, drained the glass of warm, murky water, and then set the glass on the floor and beat up my pillow.

The air seemed even hotter and mustier than usual. Street noises had started outside the window; the night people were getting up and about. The air conditioner started to make a soft thumping noise—probably trying to convince me it was doing its job. I didn't buy it; I'd take the cheap little pecker apart tomorrow anyhow, and check the compressor and the ammonia pressure.

The thumping grew louder, though, and became the sound of blades beating the air. A chorus of shouts rose from the neighborhood kids outside. I knew who it had to be but got up anyway and shoved the curtains aside for a look.

Up the street, Mikey the crazy Texan was taking his antique bubble-glass helicopter for a spin. The 'copter swayed from side to side, dipping close enough to the building walls to scrape flakes of paint off. It made the hair stand out on my neck just to watch.

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Mikey owned a junkyard which I occasionally sold junk to, when I couldn't find a retail customer to pay for a scavenge. He also laid claim to a "shuttle service," but as far as I knew no one would be caught dead in a bird with him.

Sure enough, his curly head of hair was alone in the cockpit when he swooped past my window. The lunatic. I waved but he didn't see me.

I went to bed wearing a smile. He hadn't been out in a while. Well, I had an excuse to go see him, now; I could pay his junkyard a visit and pick up some parts for Golem.

THE SCREAMER

I came awake again when the red LCDs on the jellophone clock were blinking 10:36 P.M., to the sound of a scream on the faintest edge of hearing. The hairs on the back of my neck rose and I sat up clutching the sheet, straining to hear. I couldn't be sure; it was so faint. The muffled traffic sounds and voices outside made it hard to tell—but no, I was sure someone was screaming.

Sleep, Ruby, I told myself. The cops don't give a damn what happens on the fringes of the envies' civilization, and what could I do alone? But the distant scream went on and on till I couldn't ignore it any more, up and down like the wail of someone in terrible pain and fear. I finally threw the sheet off and padded over in my big T-shirt to look out the window.

The banner boards overhead blinked bright colors, moving eyes and mouths, slogans and ads. Ugly orange light from the street lamps three floors below bounced off of concrete, water-filled gutters, piles of trash, fire hydrants, walls soaked in graffiti scrawls. Groups of people stood on the sidewalk and others walked past the hawkers and vendors with their card tables and trinket-covered blankets. One and all ignored the screamer.

In a fit of disgust I threw the locks back and jerked the window pane upward. Wet heat swallowed me whole; I stuck my head out and inhaled searing, liquid air that smelled faintly of trash and urine. The scream drowned in a swell of human voices, laughter, tires on pavement, horns honking, and the barking of dogs.

I strained and listened, tried to sift through the threads of noise. No scream. So I slid the window shut. And the scream started again.

My hand on the glass pane, I paused, listening to be absolutely sure. I wasn't but slid the window open anyway. The scream stopped again, swallowed by street noise.

With a curse, I slammed the window shut and locked it. Melissa muttered something but I ignored her, threw myself back into bed, and buried my face in a pillow. I shouldn't have been able to hear much of anything after that but I still could have sworn the screamer was out there somewhere.

I must have fallen asleep finally.

SHE LOVES ME

When Melissa woke up she stretched and smiled her sweet, sleepy child's smile at me. I was sober by then and in a little better mood. So I made scrambled Eggcels on bagels with hot, spiced kaffe, and we ate breakfast on her bed.

I told her what happened. I left out

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the part about the diamonds and the envelope; I didn't want to get her in trouble, too.

She went pale and covered her mouth. Her eyes got wide. "They took Golem? Ruby, what will we do? Calen said he'd kick us out if we don't pay the back rent by Monday."

I took her hand. I thought about the plastic baggy she had hidden beneath the floor boards under her bed, stuffed with bills, that she thought I didn't know about. I had a way to earn money; she didn't, except for spreading her legs. If anything ever happened to me she'd need every penny. I couldn't ask her to touch that money.

"It'll be OK," I said. "I'll think of something."

She seemed reassured; she laid her head in my lap and let me stroke her hair.

THE SCREAMER RETURNS

Melissa finally got out of bed around 3:00 A.M., showered, and decked herself out. She left, saying she should be back before noon.

The jellovision—or more exactly, a historical epic comedy, a space opera, some game shows and the news—kept me company all day. At about 4:00 P.M. I gave up waiting for Melissa, turned off the JV and the lights, and plugged in my water code at the shower head panel. I blew the bulk of my week's ration of non-potable water on a long, warm, luxurious shower, and soaped, rinsed, shampooed, rinsed, shampooed again. Sheer, luxurious glory.

After dripping dry, I lingered over the baby powder and lotions and brushes and such. Almost an hour later I stepped into the main room naked and feeling great. Then I caught a climpse of myself in Melissa's full-length mirror, which stood on a stand between her chair and her bed.

I grimaced, and with a sigh, ran hands over my breasts and torso, thinking about how full and round Melissa's tits were. And her buttocks. The rough spots on my fingers and palms caught on my skin: all the lotion in the world couldn't make my hands as soft as Melissa's. Her skin was softer than kitten fur or satin. What a fine body she had.

The woman in the mirror frowned at me. Stop thinking about it, I told the image, and turned from the mirror. So the room's neon color changes wouldn't have Melissa's snoring accompaniment tonight. So what. I didn't need her around all the time.

I pulled my big T-shirt on, crawled into bed and pulled the sheet up. Either the shower had overcooled me or the air conditioner was doing its job too well; goose bumps rose along my arms and legs from the damp chill. I curled up and tucked my hands between my thighs. It got noisy as groups of people walked by underneath the window, talking loudly. One group might have been fighting. I kept expecting the screamer, but there was no screaming, then.

At 10:48 P.M. when I woke up from a dream, though, I heard it: a sorrowful wail rising and falling beneath the street noise. It made my skin creep to listen to it. I tried to ignore it, but the scream kept up.

SPIDERS AND TANKS

Golem isn't my only waldo. I have Tiger, a miniature training tool built like

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an old World War II tank with two taloned arms, a single IR-to-UV wavelength zoom camera in the turret, and an exceptional sound reception mechanism set in the gun barrel. He fits in the palm of my hand and is totally useless except for scaring the tenement cats or spying on the neighbors (who, believe me, have nothing happening in their lives worth spying on). And I also have a spider waldo, Rachne; that's Greek for *spider*, I think. Rack-Knees is what Melissa used to call her.

Rachne's older than Golem, even, half deaf and blind, and equally stupid. Fine manipulation's her thing. She weighs about eighty pounds and has ten legs which can also be used as arms, with the right fittings, and can support fairly heavy loads—up to a few hundred kilos, maybe—but she can't haul the bulk Golem can. Which makes her worthless for salvage but, it occurred to me, could make her handy in the recovery and selling of hidden goods.

After fixing the air conditioner on Friday morning—not having much else to do except to call the data disk client and tell him his salvage was destroyed—I went down to the cellar. Rachne'd gotten rusty and filthy over the years and was covered with cobwebs.

I opened her abdominal cavity and pulled out her hand fittings. Breakage and loss had reduced her original complement of twelve hands to two: a three-fingered Salisbury hand whose synthetic rubber fingertips had grown porous and were falling off, and a crab claw with a tendency to stick half open.

I staggered up the four flights of stairs with Rachne, dodging half-clad filthy kids and cranky housewives, brought the machine inside, and set her up in the middle of the apt floor. After I got her plugged in to get her batteries to start recharging, scoured off the rust, oiled all her leg joints real good, and air-cleaned her circuitry, I jacked into my-her linkware and ran operations tests.

The way the apt lurched around I felt like I'd junked on acid. Phosphorous yellows and reds and sea-bottom green dripped down the walls and bled all over the floor. I-Rachne rotated her vidi platform for a look around and collapsed sideways in a twitching jumble. My-her struggles to untangle her legs resulted in mechanical apoplexy. After a few seconds I disengaged, nauseated. I had to unsnarl her legs and wrestle her back upright before I started over.

It's always disorienting, to switch machines. But Rachne's linkware hadn't stood the test of time too well, either, and we did not make a good team. I-she kept dropping things, bumping into walls, falling down in a mass of legs. It felt like I was wrestling a bear in corn syrup.

I finally unplugged for a break, wiped the sweat off my face and neck, and then threw the rag over the squatting little beast. She crouched there like a weird suit rack with this stained purple cloth draped over her core and her stick knees poking up all around.

I felt sad, looking at that ancient machine. I missed Golem.

It'd be stupid to go after the diamonds then. The cops were far too likely to be watching me. Nasser's family would have reported the missing diamonds by now, and they'd have to know it was me that took them.

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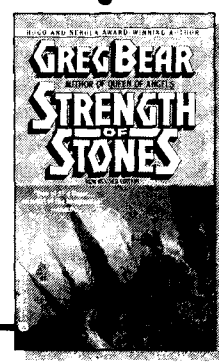

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A WORD FROM BRIAN THOMSEN

Science fiction is about looking forward. Many times these future peeks result in an often clichéd sense of wonder, and for me they form benchmarks along the collective images of my mind. Some of these benchmarks include Rocket Ship Galileo (the first Heinlein I ever read), 2001: A Space Odyssey, the actual coverage of the Apollo moon landing...and all of the works of Greg Bear.

No matter how many possible futures lie ahead—end of the world, super evolution, or therapied utopia—just waiting for me to take a peek, I can't help feeling that Greg has seen them first.

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There was no way I could be convicted, though, as long as they didn't find the diamonds and envelope. All I had to do was sit tight and leave the package where it was until things blew over.

But I dreamed of them, though. I jacked back into Rachne and worked her and tuned the linkware, and oh I dreamed.

FACES IN THE JELLY, ONE

"Let me speak to Melissa."

"She's not here right now. Can I take a message?"

"Yeah, tell her William called. I'm free tonight. I'll be at Figuero's at two."

FACES, TWO

"Is Melissa McDougall there?"

"No, she's not. Can I take a message?"

"I don't know, can you? Ha ha."

Pause. "Look, what do you want?"

"Sorry. I—it's reflex. I'm an English professor. That is, I"—cough—"I'm in town for a few days and my name is John—that is to say, I understand that she—that is, if she's interested in a date—"

"Leave your number and I'll tell her you called."

FACES, THREE

"I don't want to talk to you again, bitch. Put your roommate on."

"She's not here, Mr. Calen, but we'll have the month's rent to you by next week—"

"You deadbeats owe me five thousand sixty-five dollars for April and this is the last fucking straw. You can tell Melissa if she doesn't have the money for me by Monday you're out on the street, the both of you."

"I'll be sure and tell her, Mr. Calen."

"Drop dead."

FACES, FOUR

"Put Melissa on."

"She's not here, and she wouldn't want to talk to you if she was."

"Look." Long pause. "I said I was sorry. I paid for the patch work, didn't I?" Another pause. "Look, I know she's there. Stop jerking me around and just put her on."

"Listen, asshole, because I'm only going to say this once. Melissa isn't interested in talking to you any more. If you call again I'm going to send Golem over to bif-bam your head."

"Nobody threatens me!"

"I just did. And I meant it. Blow away."

WHAT TO WEAR?

A fifth call came in a bit later, while Master Cho and his assistants and I were moving through the slow *kata*, dripping sweat, cooling down. I flicked the reception over to the phone. Given the hour—at almost 3:30 P.M. it was several hours after Manhattan's phase one workday—it was quite a surprise to see Captain Nano-whatever's face in my tube.

I snatched up a towel, wiped myself down and, as a defensive measure, tried to summon up nasty thoughts. But I couldn't hold onto the anger. Looking at her face and knowing how easily she could destroy my life made me sick and made my palms cold with sweat. I had

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a nervous urge to smile but that would have been disastrous; I kept my expression blank.

"Ms. Kubick. Captain Nanopoulos here."

"Captain." I didn't try to say her name. "I didn't expect a call this late."

She gave me a brief smile but didn't offer an apology, so I forged ahead. "Is everything OK with G-Golem?" The stutter really blew my chill act; my face heated up.

I couldn't read her expression, but the pause before she spoke didn't seem too good. "We need to ask you a few questions, Ms. Kubick, and we'd like you to come down to the station."

"I didn't hurt the old man."

"We're not accusing you of hurting him; we simply want to ask you a few questions."

I chewed my lip. "When?"

"Immediately."

My head felt like a balloon someone had poked holes in—I'd walked into a nightmare. A little idiot in the back of my head fussed: what to wear, what to wear.

DO NOT PASS GO

Adrenaline fueled me down the stairs at a high speed. I weaved around the adolescents loitering on the second floor landing and they stared at me, whispered and giggled.

"Hey, Ruby, where's your machine?" one asked, then turned back to the others and said in a stage whisper, "She's so *jade*."

"You going *out?* Look, comrades, sister Ruby's going out. Shee-euw are you dressed! You smell like a cologne commercial!"

A burst of laughter swelled up. I ignored them, the little smartasses, and skipped down the last eighteen steps to the ground floor, hopped over Mr. Gillis, who was out stone-drunk on the first floor landing again, and checked the mailboxes as I went by. Ours was empty and so were the others. No mail delivery, once again.

Beyond the glass doors of the apt lock, heat waves made ghosts of the afternoon's long shadows. A metal trash can lay in the gutter, casting a plume of ripe garbage into the street. I shoved the heavy inner door open and the momentum that had carried me down the stairs propelled me through.

When my hand touched the outer door lock, though, it was like I'd run into an invisible wall. My hand gripped the door handle and turned to stone.

Panic boiled up in my throat; I shifted my gaze to my hand, willed my fingers to release their grip on the handle. Nothing. Not a twitch. Somebody inside had staged a mutiny and taken over my body.

I wanted to yell for help but felt like an idiot. They'd think I'd gone nuts. I know I sure did.

The impasse broke about ten minutes later, when another tenant came up outside and keyed the lock. When he pushed the outer door open, I had to step out of the way and that shattered the paralysis. I escaped through the door into the street before it closed again.

Once I had gotten past the door, it didn't seem so bad out. The air was hot, but drier than I'd expected. High bug density, as usual. Flies large and small hovered around the trash. I waved away the gnats that were trying to fly up my

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nose, slapped mosquitos off my calves and arms, and pulled my wrap close. A woman with an infant sat on the stoop across the way, and a skinny boy with a big belly sat next to them, languidly bouncing a big, soft, red ball that played a rubber band bass tune, *boing, boing,* when it struck. His belly made me think of the old man; I winced.

They were looking at me. It wasn't logical but I had this idea they were ogling me, like there was something wrong with my wrap or my sunscreen face paints that they could see but I couldn't. I felt like yelling at them but I knew that was crazy, so I resisted, and headed for the monorail station.

TAKE A GOLEM AND HOLD THE ROCKS

"You wrote a batch demon that deleted your waldo's CASC log every two minutes." The young man looked up from his hand-held kelly through specs perched on the bridge of his nose and raised his eyebrows at me.

He wore a lab coat with a tiny pin on the lapel that said "Associate Commissioner." His china-blue eyes peered through long, thick, auburn eyelashes that Melissa would kill to have. Otherwise he had a plain, pockmarked face and dull red hair amid which nestled a mushroomlike, metallic nub: his beanjack. So he was a beanhead like me—except his no doubt was the latest model. He was also incredibly skinny and tall with hands so strong, long-fingered, and agile *I'd* have killed to have them.

Beside him was the precinct captain, hands in her pockets, watching me with that thoughtful look. And I had the feeling from the way they kept from getting between me and the big wall mirror that there were people watching from behind there, too.

They'd locked me in the bare room again, with three glastic chairs and a table this time and those same prison windows. Only this time it really was me facing them. Not a happy moment in my life.

Golem's CASC log is a digitized video-audio recording of everything that happens to him and it's restricted-access, only allowed to be touched by Computer and Artificial Systems Commission reps, and only under certain conditions—such as accident investigations. The log is hard-wired against altering and you can't view it without special equipment. It can be deleted if you know the opsys language but it's illegal to do so without archiving the log.

After a while, though, the CASC log burns up so much memory that everybody who knows how to hacks into the system and deletes the log occasionally. Almost nobody bothers to archive the old log in the CASC database—except government-secured AI companies that have to fill out those tedious 62-Qs every quarter. It's no worse a crime than copying a gamer's laser disk, or hitchhiking.

Which, in my current situation, was no great comfort—because if they couldn't get me for murder or theft they'd probably ice me on overblown charges of computer crime.

I shoved my hands between my knees, hunched my shoulders in my single good gauze drape—a hooded dress drape in burgundy and tangerine, with my mother's heirloom garnet brooch at the shoulder—looked from him to her,

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and nodded.

The air was overly warm and dead still, and that had to be deliberate. Sweat kept popping out on my face and torso; when it started to roll it felt like tiny flies walking down my skin. Beneath the perfumed powders and deodorants, I stank like fear. The acid in my stomach and intestines threatened; I had a horrible fear I'd lose bowel control and fart.

Nevertheless, by some miraculous contortion of will I manged to hold my voice steady. "I had to. Otherwise the buffer would have interfered with Golem's motor operations."

The man exchanged a look with the captain, and I swallowed spit. I was lying; I hadn't monkeyed with the CASC buffer till after I'd taken the old man's goods, well after we'd made it down off the scaffolding.

"Cel?"

The man shook his head. "We filled several of the unit's auxiliary buffers with data and essentially all of its critical motor operations remained operational."

The captain and the CASC commissioner looked at me again. In for a penny, I thought, and sat forward with a deep breath and a sudden determination. I could out-argue this beanhead.

" 'Auxiliary?' " I repeated. " '*Essentially* all?' You couldn't have tested his CASC buffer itself; he's got all the hard-wired controls against it. And the location of the buffer can be as critical as its size in a memory-depleted situation."

Again the captain threw a look at the CASC rep, and again he raised his eyebrows. "Possible, but unlikely. Our tests were thorough."

"I was climbing down a building in a six-point hurricane, for Christ's sake. I couldn't afford the risk!"

"My analysis shows you would have had enough memory without deleting the CASC buffer. It was a clear violation of CASC protocols."

"Well, excuse the hell out of me for putting life and livelihood above your petty bureaucratic protocols!" I ended up on my feet, trembling, fists clenched. Nothing gets you worked up quicker than a guilty conscience.

The CASC man stepped back, alarm on his face. The captain interposed herself between him and me. Two large males in uniform with stun sticks entered the room and stationed themselves at the door.

"Sit down," the captain told me. She sounded like she meant it.

Ice out, Ruby. I dropped back into the chair, took another deep breath, and met the captain's gaze. "At the time it didn't seem like I had a choice."

The captain looked at me for a moment, then made a "hmph" noise and dismissed the CASC beanhead.

The lieutenant who'd questioned me the first time came in as the beanhead went out, and went over to the captain. She and he held a brief, hushed conversation and then he left again.

"If you're going to arrest me I have the right to legal counsel," I said.

The captain nodded. "You do. But as I pointed out before, we're not charging you with anything."

"But you still have to appoint someone, don't you, if I can't afford a lawyer?"

"Like I said, though." She broke off

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when the door opened again and the lieutenant held the door for a slim envie woman in her mid-forties.

The envie woman passed me and a scent of musky-sweet spice like incense and tropical flowers trailed her. She wore a lightweight, formal-dress cool suit with gold buttressed epaulets, inset French lazy-C heels, and an ice-toned light pattern. It took main force to tear my gaze away from the bursts, curves and swirls of light that traced her form.

She extended a bejeweled hand to the captain. Her black and golden hair was sculpted, polymerized in a single standing wave with sparkles, and her face had the texture and color of pale obsidian. Her slick, crimson lips had a slight pout, her nose was narrow, and her green eyes were black rimmed, Egyptian-style.

When she glanced at me her made-up eyes had a weird look in them, bright and shocky, like nerves and euphorics were the only things keeping her together. The smile she gave the captain had that same plastic quality. But her voice was all melody and smoothness.

"Captain."

"Rachel. Thanks for coming down. This is Ruby Kubick, the young woman from Queens who tried to rescue your husband. Rachel Karam," she said to me, gesturing at the woman.

The woman turned and looked me up and down. The muscles around her eyes and mouth twitched, and I wondered if she was trying to keep from showing revulsion.

My hands gripped the chair seat.

"My thanks," she said, with an accent that reminded me of the old man's. French, again? But some unrelated facts clumped together in my head and I realized that she and her late husband must be Egyptian.

Her thanking me was too jade; it gave me the creeps. I didn't let anything show on my face, though, merely shrugged. She dabbed her eyes with a lacy hanky and turned to the captain. "The funeral home is prepared to receive Youhanna's body. . . ."

"Fine. Lieutenant Rivera will help you with the formalities."

"Will you be able to attend?"

"I'd be honored to." She paused. "Words must be small consolation to you now, but I and many others looked up to him. His loss will be deeply felt."

The woman's face twisted and an awful sound forced its way out of her throat. The captain spoke to her softly and laid a hand on her shoulder. A couple of tears spilled out of her eyes.

Meanwhile the eyes of the two uniformed cops and the lieutenant were boring into the back of my neck. I was starting to feel about the same way a bug must when the cat's attention wanders. Every muscle in my body was strung as tight as piano wire and I wanted to run screaming. Was this some subtle torment; were they trying to get me to lower my guard?

"Have you recovered Youhanna's hypercat yet?" the envie woman asked. The captain nodded.

"We dredged the bay and found the yacht not far from the scraper where Ms. Kubick reports he was stranded. It appears to have capsized in the turbulence, so it checks with Ms. Kubick's story. Lieutenant Rivera will turn over to you all of his personal effects that were recovered from the yacht."

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The woman nodded and dabbed her eyes. They had a glimmer in them, a nervous intensity. "What did you find?"

The captain glanced at the lieutenant, who shook his head. "I'll be glad to show you, ma'am. Nothing much. Maps, boating tools, and so on. A change of clothes and some boots."

"That's all?" she asked the lieutenant, over her shoulder. "Nothing else?"

The lieutenant nodded. The woman's glance went to me and her expression flickered. I was suddenly certain: she knew I'd taken the diamonds.

The captain's attention sharpened.

"What's missing?"

The woman shrugged and her gaze slid away from me, back to the captain. "I can't imagine. I didn't board the yacht, only saw him off at the dock that afternoon before he—"

Then she broke off and struggled with tears. This time, though, her struggle felt phony to me, and I think the captain felt the same way. She looked from the woman to me to the woman again, and her eyes had narrowed.

Nanopoulos wasn't the only one who was confused. The only thing I knew for certain was that the envie woman wanted me to have those diamonds. Or she didn't care if I had them. She hadn't reported them missing. And she hadn't mentioned the envelope, either.

I had this sudden, stabbing desire to know what was in that envelope, to hold the diamonds in my hands, to make it all real. A terrible fear filled me that someone had found my cache and stolen the contents. Not a realistic fear given where they were hidden, but I couldn't shake it.

The captain scowled and made some more "hmph" noises while eyeing me, and then told the lieutenant to return my waldo to me. The lieutenant took me into the main precinct room, made me sign some forms, and then took me to the store room.

JUNKYARD BAIT

They'd shoved Golem in a corner among stacks of vivisected computers and electronics equipment. He towered over the gutted electronics, a skeletal giant, inner parts and wires exposed all over, smashed chassis, arms missing, camera eye dangling.

I thought I was prepared for it. But seeing him there like that, it was too much to bear. I burst into tears. The lieutenant, looking embarrassed, handed me a handkerchief. I thanked him, wiped my eyes and nose on my drape, and used the hanky on Golem's chassis instead.

After prying open one of Golem's chest panels I pulled out my waldo beanie, which I hate, but there wasn't any other way to get him home. I also got out a can of siloxane hydraulic fluid, a hand-case of tools, and some Teflon patch tape from pockets in my baggy pants.

When I pulled him out from the wall I got a good look at the Coffin. The dried blood stains on the Tuffnet webbing made me cringe.

I powered Golem up long enough to check his reserves. The gauge said he'd used up the main power packs and was on emergency reserves now, but that should be enough to get him home. I reached in and dug among the snarl of

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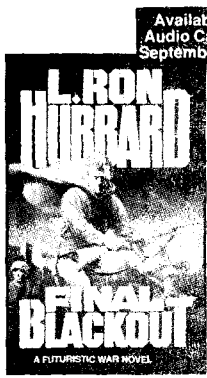

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wires and tubes of Golem's innards, feeling for the main hydraulic lines.

"What are you doing?"

I sat back on my knees, wiped the slickness from my fingers, and favored the man with a look. "What does it look like?"

"You can't do that here, lady. Fix him at home."

"Look. He's not going to get ten feet without me patching his worst hydraulic leaks. Do you want him out of here or not?"

He frowned at me.

"Maybe we should get Captain Nanopoulos to settle this," I added.

"Just hurry up about it," he said. He lit up a cannabette and smoked it leaning against the doorjamb, watching me work, which did things to my nerves and made it all take twice as long.

RUBY-ME

Once done, I pulled out Golem's Tuffnet and shook it out. "Give me a hand, here, would you?"

The lieutenant gave me a *who, me?* look.

"Yes, you," I said. "Hold this net, just like this."

He took hold, looking dubious, and I struggled in. I stuffed earplugs in my ears to avoid the double input, and then put the waldo control beanie on. It's made of Kevlar, with a beanlink and CPU inside the crown, and it straps under my chin like a mountaineer's helmet. It fit on with a click that I felt in my skull rather than heard. While the program loaded, I reached up and put a hand on Golem's chassis.

"Let's go home."

Then the linkware pulled me into Golem, and somewhere far away I felt my hand fall as if I'd dozed off. I-Golem looked down at the woman in my arms. It was Ruby-me, of course, and her eyes were closed, fluttering a little. She-I curled with my cheek against Golem's chassis.

She-I looked so young and vulnerable from the outside, not ugly and scrawny like me. I was terrified that I wouldn't be able to keep her from harm; I wished she were back home, safe, right this very minute.

I hate that damn beanie.

SHE LOVES ME NOT

Melissa asked, "Rube? That you?"

"Yeah, it's me."

I-Golem clanked and dripped into the entryway, then shut and bolted the door. After parking in the corner between the hall closet and the bathroom door I shut Golem down, pulled the beanie and earplugs off, and scrambled out of the Tuffnet. I'd have to put Golem in his usual spot in the cellar in a bit, and clean off those blood stains, but at the moment I was too tired to bother.

I pulled the gauze drape off over my head, fluffed my hair out, licked salty sweat from my lips, and sank against the doorjamb with a deep breath. Home, safe.

In the main room, Melissa sprawled over her bed in cutoffs and a choker of plastic pearls and nothing else. She was reading a sciffy zipper-ripper novel, twirling a lock of wet hair with her finger and thumping the bed with her leg. She'd scrubbed off all the layers of sparkle and makeup; her skin was so clean it shone.

"Hey," I said. "I got Golem back."

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"Yeah, well, you left all your shit out."

I looked around and realized Rachne and my tools weren't out any more. I stiffened.

"What'd you do with my things?"

"I dumped them in the cellar. I could barely walk in here."

"Melissa, those are delicate tools and I had them carefully organized—on *my* bed. You may have ruined them and I need them to fix Golem."

She shrugged a single shoulder. "So don't leave them lying around. Besides, they weren't all on your bed. You left half of them on the floor."

I went down the back staircase to the cellar. Rachne looked OK, over in the corner of my nook, but the tools were another matter. Melissa had thrown them haphazardly into the bottom of my tool cabinet and hadn't even bothered to lock it. When I slid the door back and saw them, my hands started to shake. I took the tools upstairs, spread them out on my own bed, and inspected them closely, one by one. By some miracle, all of them had survived her careless handling intact.

I sensed she was looking at me and glanced up. I was right. When she met my eyes she burst into laughter.

"They're just a bunch of tools and things. I didn't hurt them. Stop looking so persecuted."

After a moment I said, "Don't ever touch my tools."

She started reading her book again. I wanted to yank her hair and pound on her clean-scrubbed face. Instead I said very quietly, "I mean it. Never touch them."

"OK, I'm sorry." She gave me one of her phony smiles. Sure you are, I thought.

After a minute she asked, "Did I get any phone calls?"

I didn't answer. She raised her eyebrows at me, but I didn't feel like backing down. Not after she messed with my things.

"Rube."

"What?"

"Stop being cute and tell me who called."

I shook my head. "I refuse to pimp for you any more."

She went pale and sat up. Then her skin flushed red from the breasts up.

"I'm tired of setting dates for you and lying for you and chasing off the shitheads," I went on. "Get an answering machine."

She was silent a full minute, it seemed like, just looking at me. I began to regret what I'd said. She leaned forward and covered her mouth, then straightened. Seeing the look in her eyes, I started to feel sick to my stomach.

She said, "You just pushed me too far."

I didn't say anything.

"How *dare* you call me a whore?"

I didn't call you a whore, Liss. I love you. Let's not fight. Say it, Ruby. But I was tired of backing down to keep the peace.

"They pay you," I said, "and you fuck them. Call it what you want."

She shook her head like she couldn't believe her ears. "At least I've got friends, I've got a life! You spend all your time junked out on your stupid machines. It makes me sick to see you lying there, twitching and drooling and

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talking to yourself all the time.

"You never get out, you don't have any friends, you expect me to be *everything* to you."

Bif bam. That hurt. She wasn't saying it but I knew she was thinking about the time that asshole sliced up her face. I'd taken her to the hospital, waited those long hours with her in the waiting room, stayed while they patched her up, and helped her home.

She had unplugged from reality; she just sat all afternoon staring out the window and looking fragile, her face and neck covered with oily skinseal patches and bruises. But I held her hand and told her how beautiful she was and how much I loved her, how sorry I was that someone had hurt her, and finally she started to cry. She sobbed and sobbed over the hurt and fear and violence.

Finally she took me to bed and asked me to hold her, and it became more than that. Maybe I should have said no when she kissed me. But I didn't.

If making love is a craft, Melissa is an artisan. Even drugged and hurting the way she was, she put all of her mind and soul right out there, at the surface of her skin. And with her touch, in the places of me where her lips and fingers lingered, she transferred that beauty to me. The touch and smell of her, the arch of her back, her eyes half-slitted, the smile that spread across her lips afterwards, when she nestled in the crook of my arm . . . I watched her sleep, understanding then why all those men always called her back.

In the morning she'd gotten up first and fixed me breakfast, but she didn't want to talk about what had happened; she acted like everything was normal. I sure didn't feel like things were normal.

After a couple of days I'd screwed up my courage and brought up what had happened. She'd said that it'd happened because she'd needed someone to hold her and make her feel sexy, but that wasn't how she felt about me. She sure was convincing the other night, I'd said, but I never mentioned it again after that. The memory of it had stayed with me, though, and it was about as welcome as a sore tooth.

Several times I tried telling my body to stop lusting for her. It had a mind of its own, though, and that's a fact. So what she said stung more than she probably meant it to.

"I never asked you to be anything for me," I said.

"Bullshit. You're always making demands."

"Like what? Name one thing I've asked you to do for me since I came here. One thing."

But she wasn't listening. "I'm tired of you using me. I'm tired of being your crutch."

"My crutch? *I'm* using *you*?"

"Jesus Christ, I spend half my money on groceries to feed you because you won't go outside the apt!"

I frowned. "That's not true. I buy groceries. I sent Golem to the store just last week."

"I buy most of the food and you know it. Besides, it's sick how you never go out. I nearly died from shock when I came home today and you weren't here. That's the first time you've gone out in months." She pressed her hands to her lips again and when she lowered them and looked at me, her face had gone as smooth as a

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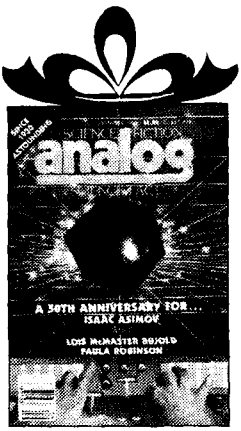

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pane of glass.

"I've been wanting to say this for a long time. The truth is that you're really messed up and you should see someone. Get professional help. Go to the mental health clinic."

I stared at her, flabbergasted. "*I* need professional help? Me? You're the one who'll hump anything with two legs and a penis and ask for spending money. You call those men friends? You call the man who sliced your face open last month a *friend?*

"You stay away for days and then come back and expect the apartment to be spotless, exactly how you left it. You spend most of your time ignoring me except when you can find something to bitch about." *When was the last time you paid your share of the rent?* But those words stalled at my lips.

She'd use that money, all right, if I told her she had to, and then she'd be right back out there, sleeping with sickos and maniacs to bring in more. No. But I was still trembling with anger. "How can you accuse *me* of using *you?*"

She just stared at me. Then she grabbed her gauze wrap and slammed the door on the way out.

I marched Golem down to the cellar and then went to bed. I was exhausted and fell right to sleep. But a bad dream, about how the old man had died, woke me up again around 10:30. I got up and roamed the apartment like a caged cat. Four hours wasn't enough sleep but there was no way I could doze off again. I couldn't get Melissa off my mind.

I tried watching jellovision, but nothing good was on and I was restless. There were other things I could do, though. Golem needed replacement parts. The diamonds and the mysterious envelope kept resurfacing in my thoughts. So I geared Rachne up; I figured I had plenty to do to take my mind off Melissa.

I BUY JUNK

The Lone Star Used Parts Yard and Scramport Shuttle Service looked weird beneath the harsh bar-lights of sodium and mercury. Otherwise the place hadn't changed much since the last time I'd been there. The guard cats set up a fearful noise when I-Rachne tripped up to the fence, and a familiar voice yelled, "Who's that? Who's out there?"

I-Rachne tilted her vidi platform up. Lit by the glare of the yard lights, Mikey was squinting down at me from his office on the second story. One hand gripped the short, stout barrel of a semishot, which was aimed in my-Rachne's general direction, and I didn't have to think hard to figure out where the other hand was.

He and everything else was in black, white, and greys; I'd been unable to fix Rachne's color malfunction and had left it turned off. In my head, Rachne's radio transmitter crackled across the sounds of distant traffic and lapping waves like a geiger counter in a nuke dump. So I had this sense I'd been transported into a bad copy of an old flattie. I tweaked her linkware, trying—unsuccessfully—to improve sound reception, then crabbed forward on her stick legs and cranked her volume up.

"It's me," I-Rachne yelled. "Ruby Kubick. Need some parts."

"Ruby, hey! That really you?—Shut up, Pete, Ginger! Cut the caterwauling!

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Down in a nick."

His head disappeared inside the window. While I waited, I-Rachne did a slow turn, which is a complicated maneuver with her ten legs all clicking and mincing around each other, for the practice . . . and also just to make sure no one—like the cops—was sneaking up behind. I-Rachne had sneaked out down the fire escape in back of the building, and had been very careful getting here, but you can never be too sure.

The only things stirring in the street and the puny dirt parking lot were bits of trash tumbling before the wind—it was a little early for the evening crowds, and not the kind of place where you'd expect to find the dayfolk. Behind the chain-link and barbed wire fence, piles of metal and rusting machinery filled the yard. Mikey had expanded his inventories since the last time I visited. To the far right were his two antique helicopters.

Two enormous genie guard cats crouched on the opposite side of the fence, staring at me-Rachne. They'd stopped yowling when Mikey'd told them to, but they were still stiff with hostility—hissing, muscles bunched, eyes dilated to the whites, ears laid back. I made a face—a satisfying gesture of defiance, even if they couldn't see it.

A storm was moving in. On the far side of the yard a row of dead elms clawed the sky. Lightning laced a dark, boiling thunderhead beyond the row of ramshackle buildings across the canal and backlit Mikey's silhouette as he descended the stairs. Through Rachne's eyes the lightning looked like an x-ray of the storm's skeleton. Mikey still had the gun, which was only good sense. What with Rachne's low-res vidis and the poor lighting, I couldn't make out his face.

" 'Bout time you dropped by!"

Hearing his voice made me grin; I could feel the tug in my cheek muscles back home. "Hey ya, Mikey."

"People been asking whether you off and got yourself indentured to the platforms."

"I wish!"

"This the same model I recall you fixed up way back when?" he asked, gesturing at me-Rachne.

The linkware automatically translated my nod, over-amplified, and lost its frame of reference. It took an irritating several seconds thereafter for me to find Mikey again, and by that time he was close enough for me to make out his face. He was grinning at me through the chain link with—as usual—a toothpick between his teeth. He had scars on his neck and forehead, a gauze robe on, and his brown hair was all curly and rumpled.

Mikey had been indentured by the Army ten years ago. He had spent four years flying collocopters in Antarctica, before the bombs had made that particular piece of real estate too radioactive to fight over. Then the Army had made him obsolete the same way Toshiba-Merrill had me, but all he had to show for it was the scars. That was because when they'd asked me if I wanted the brain web out, I'd said no—I figured outmoded equipment was better than none. But maybe Mikey had the right idea. He made a lot steadier living out of junk than I did.

From the blanket-creases on his

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cheek, I'd probably waked him. But this was a twenty-four hour yard and he must be used to it; his customers were mostly refugees and fringers, who didn't have envie suits or waldos and did most of their outdoors business between midnight and 8:00 A.M.

"She ain't improved much over time," he asked, "is she?"

Indignant protests filled my mouth but I shoved them back down before they could get out. He was right.

"Nah," I-Rachne admitted with a sigh. "I haven't piloted her since I built Golem. Speaking of which, I need parts. Lots of parts."

"Ah." His eyebrows shot up. "For Golem?"

"Yeah." I put Rachne on standby for a second and back at the apt, propped myself up on an elbow and checked the sheet of paper in my lap. Then I lay back in the gel and downloaded back into Rachne.

"Got any Pratt and Whitney Series S-Jiminy 40L parts in stock, or any 42Ns? Or GM&E 77-12s?"

"Hmmm. Don't know for sure, but I don't think so. Let's check anyhow, though. They ain't manufactured those in so long, I haven't been back there in a while .d don't recollect too well what I got."

"And I particularly need some giga-crystals—UAI 8200s. Though I could do with 8100s if I had to."

He got a thoughtful look on his face. "Yeah? UAI 8200s?"

"You got some?"

His expression seemed pained. "Not to sell. They're in Monster Mash."

"Ah." Disappointment settled in my stomach. Couldn't blame him, though. His collocopter Monster Mash was his baby the same way Golem was mine. And I wouldn't gut Golem for parts no matter how hungry I got.

He gnawed on his toothpick with an earnest expression. "What-all else?"

"Tubing, metaceramic plate, structural titanium. Assorted odds and ends. Let's see what you've got."

He unlocked the gate and opened it. I-Rachne danced inside with her interlocking gait, rotating the vidi platform to keep an eye on those guard cats. I didn't care how gene-mod clever and obedient they were, the last thing I needed was damage to another one of my units.

Mikey walked me-Rachne past his helicopters on the way to the waldo stockpiles, which was a little out of the way, and he kept looking at me-Rachne out of the corner of his eye. There was his tiny 1960s bubble glass model, Tinkerbell, which was the one he'd flown down the street the other night, and looming over it was Monster Mash.

Mash was a turn-of-the-century military bird, a big ugly green thing with sets of two propellers and white stars painted on it and a tail section riddled with holes. He'd been adding equipment, disassembling it, tinkering with it, testing it, and reassembling it for over a year now. As far as I knew he had yet to get it airborne.

I realized why the detour when I noticed he also had one I hadn't seen before, a sleek, aerodynamic black collocopter with five props overhead, tinted windows that made it look like a sky cadillac, and "WAPL News at 11" painted in luminous, silvery letters on the sides. I broke into a smile and

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Rachne pointed with her rubber-coated talon. "New one?"

"Yup."

"You named it yet?"

He grinned and spat out his toothpick, which was a splintered, mushy mass of pulp by now. "Not yet. Got it at a discount when the station that owned it went belly up. I've flown it once. On manual, of course," he said at my surprised look. "With specs and gloves. She's a fuel gobbler but she flies lighter'n a piece of dandelion fluff."

"Mikey, you have the soul of a poet."

"She's stealthy, too—radar invisible and sonar soft. . . ."

"Figures." I laughed. "I bet that's why they went bankrupt. One too many invasion-of-privacy lawsuits."

He laughed, too, open-mouthed barks of sheer hilarity. "Damn straight. And she's a beauty, Ruby. Come on by sometime; I'll take you up and give you a tour of the island you'll be talking about twenty years hence."

I-Rachne made a choking sound. "Thanks, I'd rather die."

He pulled out a new toothpick to maul and waited while I-Rachne rummaged through his stacks and shelves of metal and plastic waldo remains. I-Rachne found a new headlight and a camera I could use to replace the eye Golem lost. Then I made a real find: two robotic arms that I was sure I could figure out a way to attach and program.

One arm was a new version of the two finger-handed arms I'd lost: an eight-mutually-opposable-fingered-hand on a socket-jointed arm. Both the arm and the fingers had an extra joint. The extra joints and length, and the extra movement of each joint, would take some practice to use but would end up giving Golem a lot more dexterity.

The other I was even more excited about. It was true vintage tech, a stroke of great luck: an antique warrior arm—a two-meter snake in a titanium weave sheath, in excellent condition. Its connector was a sister technology to Golem's arm platform. The warrior waldos that'd used snakes had been famous during the Antarctic Conflict for wreaking havoc among enemy equipment. My guess was this particular arm had been manufactured near the end of the Conflict and then never used; it was that clean and unmarked.

The snake had several titanium and metadiamond "hand" attachments for drilling and cutting through metal, and various splicing tools. Six electronic jimmy-jacks, hard-wired into the arm, must have been used for breaking into or interfering with enemy equipment and communications in various ways.

What war waldos use against enemy troops, I could put to good use in salvage—against inanimate obstructions, old electronic locks, security systems, robots, and the like. The arm came with a training and reference chip that could be installed in Golem's crystal. Trey schick.

I-Rachne found several other useful odds and ends. But the most crucial items, memory gigacrystals, he didn't have. Looked like I would be seeing the insides of a lot of junkyards and two-hand stores over the next few weeks. I-Rachne cast a last, covetous look at Monster Mash as we passed the 'copter on our way toward the front of the yard.

Mikey tallied up the cost on his hand-

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held kelly. After wrapping the purchases, I-Rachne dropped them in the carriage sack beneath Rachne's belly. Rather than tackle his metal stairs in Rachne, I put her on standby again while I disengaged to use our jellophone and transfer the money to his account.

The account balance at the base of the jello-tube was dismally low. With a wince, I hit the transfer button.

"Do you wish another transaction?" the bank's digital ghost lips asked. I disconnected instead of answering and then sank back into the couch, plugged in and reengaged with the linkware. Mikey was still chewing his toothpick and eyeing me-Rachne thoughtfully, but I couldn't tell what he was thinking.

"You change your mind about the UAI 8200s?"

He shook his head with a sympathetic laugh. "Sorry, Ruby. I may be a mercenary bastard, but I don't sell family."

"Just checking," I-Rachne said. "I'll wait while you verify the transfer."

Mikey laughed and waved a hand.

"You I trust," he said. "You was always straight."

That gave me a queer little flutter in the stomach, remembering the dead old man's bare ears.

"Thanks, Mikey."

"Come by again," he said. "Next time come in the morning time when Amity spells me, and bring yourself along like the old days, instead of this old bucket of bolts. Some of the guys been asking about you. We'll stand you breakfast."

"Sure. It'd be a lot of fun."

I could tell by the look in his eyes, though, that he figured it wouldn't, and I didn't get out much any more so I figured he was probably right.

WE DO THE CITY

After that I-Rachne spent hours wandering the streets of Soho and the Village. Early on, the storm struck; umbrellas bloomed like a field of canvas wildflowers. I didn't trust Rachne's construction well enough to stay out in the wet—she's strictly a *Do Not Immerse* machine. So I-she stood in the doorway of a boutique till the storm passed, and the spread of umbrellas furled and died.

Then I-she went back out and lingered in front of shops and delis and art galleries, restaurants and slidewalk cafes and theaters, tripping over her too-many feet and drawing an occasional rude stare from the tourists and locals crowding the walkways and streets in their cool suits, waldos, and wraps.

The street traffic rushed past—electric collocars and buses, motorcyclones, hand carts, pedal carts, rickies, and bicycles—and the canal traffic floated in the middle of the avenue: the flopeds and globe-lit, tourist-filled gondolas that rocked in the wakes of speedboats, pixiboats, and the sleek hypercats that skimmed the surface of the water like dragonflies.

I-she passed a dock filled with plain little rowboats with strings of ugly bare bulbs, made beautiful by simple reflection and repetition. Wind, music, sirens, horns, voices, machines—the sounds swirled around each other, merged and collided like ocean waves against a barrier reef. Rachne, like Golem, has no olfactory or tactile temperature sense, but I could almost smell the

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bitter-fresh ozone, feel the wind on my face.

It'd been so long since I'd been on the streets; I'd forgotten what an elixir the city is—faces and masks and paint, legs and arms, suits, wraps, and mostly naked bodies—lights on water, angles and mannequins and machines and humanity, electric flashes, steam and running water from holes and grates—all these impressions and glimpses flowed around me; even in black and white it captured me, made me love it again.

The city distills life into some intoxicant, an energy more dangerous than any designed drug, that flows through the streets and binds you up in it, if you let it. If Melissa could have heard me thinking that, she'd have laughed. But she's caught by it, too. And I suppose it's easier to love such a place when your awareness is carried in a metal body that puts nothing of you at risk. So I-Rachne wandered and sipped at the streets of Manhattan from my safe haven in Queens.

Till very, very late. Till I was sure that no one could possibly be following me.

THE STASH

The notorious brownstone at 178 Christopher Street, where the terrorists who blasted the Antarctic ice shelf loose built their atomic bombs, is still standing after all these years and is still hot.

The row of buildings is cordoned off from Bailey House at Weehawken to the burned-out apartment complex at Washington Street. To keep the sea and other trespassers out, the street's blocked off with a thirty-foot concrete dike and topped with concertina wire. Big signs in maroon and yellow warn people off and the area around it has gradually been abandoned. Everyone keeps away. So getting over the fence unnoticed was easy. .

I-Rachne jumped from the edge of the dike and alighted with a clatter of metal feet on the street inside the barricade. Nothing had changed in three days. Lights on Washington and Weehawken carried faintly. Paper and dead rats littered the street. A knocked-over fire hydrant dangled from an eight-inch pipe around chunks of sidewalk. The windows were mostly shattered; doors leaned open. Beyond the dike, in the distance, traffic rushed past and a ship's horn blew.

I-Golem had tested the area earlier. Building 178 Christopher had plutonium contamination all over the place. So, though Rachne didn't have a geiger counter, I knew radioactivity levels were significantly elevated even where I-Rachne stood half a block away. Even machines can be hurt by radiation; to avoid damage to Golem's circuitry and keep from radioactivating his metallics, I'd picked an apartment building closer to the dike.

I-Rachne picked my-her way through the trash, rocks, and dead rodents to 161 Christopher. Scrambling over the rubble that filled the doorway, I-she stumbled but kept her balance. Miraculous.

The door had an old-fashioned, nonmag lock which neither Rachne nor Golem had the software to handle. I did, though: the old-fashioned kind. My dad had been a salvage man, too, in a manner of speaking, and I'd picked up a few

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of his skills as a girl. That was before I'd run away at sixteen to join Toshiba-Merril's waldo mining project on the Moon. T-M hadn't treated me much better than my parents had, but the health care was a hell of a lot better and the food more edible than Mom's.

After picking the lock, I-she pushed the door open and dug the flashlight out of the carriage sack beneath her belly. Inside the building it was pitch black, and Rachne has neither lights nor IR vision.

The crack in the wall, when the flashlight's beam first struck it, brought back the memory from the other time. My heart started to beat like hammer blows. Glimpses of the peeling paint on my own ceiling and the control panel circuitry above my head punctuated my view of the trashed old building. Concentrate, Ruby. This is no time to stutter.

I-Rachne found my-her way to a bathroom in a second floor apt, and opened the medicine cabinet. The gelpaper packet was still there and so were the diamonds, wrapped in netting and teflon sealant tape.

My mouth went dry and I could feel myself trembling. I-Rachne snatched the bundle up, rolled it into a tight cylinder, and crammed it into the storage compartment inside her steel-blue belly. Then I-she made for home. I must have tripped poor Rachne up five times in the first twenty feet alone.

RICH, RICH, FILTHY RICH

I sat there in my squish-couch, still hooked up to Rachne's linkware with the brain web wires draped across my shoulder and the envelope across my knees. I pick the diamonds out of the Teflon tape one at a time, to roll them between my fingers and hold them up to the incandescent light of the amp-lamp clamped onto the control panel above my head.

There were eight, the smallest pair at least a carat in size and the largest closer to four, if I was to hazard a guess. All faceted, rainbow fire-trapping prisms set in red gold; I didn't have a clue what they were worth but it must be a lot.

Staring at them, it finally began to register on me: I'm rich now. Rich enough to buy an interface upgrade, rich enough to buy a new waldo—or perhaps to retrofit faithful Golem. Rich enough not to have to starve and beg between jobs, to afford a real air conditioner, even an envie cool suit and be free to leave my house by day and not be cooked to death. Rich enough to buy sanity and safety. Eight white stones.

And there was the envelope. I flashed on a memory of the old man's hands clutching it to his chest. It was something more precious to him even than diamonds.

Curiosity got the better of me. I rolled the diamonds carefully in a hanky, set them aside, and then picked up the envelope. The big red letters stamped across the front said "PERSONAL AND CONFIDENTIAL—Sidra Nasser." I ripped open the envelope with a screwdriver, which violated the opening instructions printed in reflective letters across the back seam. Beads of gelpaper insulation spilled from the envelope's torn lips, and as they touched air turned to oily liquid and trickled over my bare thighs.

I reached into the envelope and

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touched a piece of paper, something angular on a chain, and a second, smaller envelope. I pulled them out.

The paper was a note and the angular thing on a chain, a bronze cross. The smaller envelope had some Arabic writing on it, along with an official-looking seal, and it was bound with a ribbon. The note was in English. It read:

Dear Sidra,

I have attempted to visit you two times now, but the sentinels of your circle of worship have refused me entrance to speak with you. They say you don't want to see me. I suppose I can understand.

One cannot take back words once they have been spoken. I wish to God I could. After my heart troubles last fall I realize how fleeting life is, and how important you are to me.

My will includes you once more. I've enclosed an official, signed copy of the will, witnessed by Rachel's cousin, Jehenna, and also Ibrahim Hanna, whom you may remember from our summer vacations in Aswan. Rachel has the other copy and will file it with our legal counsel. The cross is yours, too, as I promised when you were a boy.

You're now my executor. If it is still your wish to turn your share of the inheritance over to the leaders of your pagan faith, I hope you will reconsider. But let me not resurrect that specter now. Whatever you decide I will accept.

I want to see you again. Fifteen years is long enough; it is too long. The man who delivers this to you has been told to escort you, should you wish to accompany him now, or to provide you with information on how to reach me, should you need time to think.

I was a stubborn old fool. Forgive me.

The signature was an illegible scrawl.

The other envelope must have held the will. I didn't particularly care what he'd willed and to who; it for sure wasn't me, and by now I was feeling funny enough about opening the big envelope. So I shoved the small envelope back into the bigger one, along with the cross and the note. Then I put Rachne away in the basement, and came back and looked out the window for a while.

Haze, smoke, and heat waves blurred the air. The crowds had abandoned the streets in the past half hour; not even the neighborhood dogs were out. I tapped fingers on the windowpane and found the glass hot to the touch. It had to be 125° out there, and summer was weeks away.

I unfolded the hanky and looked at the diamonds again, then tucked them in the hip pocket of my cutoffs. My dad, I'd hated him. When I was sixteen I'd vowed never to be a crook like him.

And a memory of Nasser surfaced. While I-Golem had been wrapping the diamonds in tape, back at Christopher Street, the old man had jerked up in the Coffin, deforming the Tuffnet, and his eyes had stared toward me in the dimness. *Rigor mortis.*

For an instant I thought that he'd been lying in wait so he could catch me in the act. I'd screamed and jumped so high I pulled loose of my connectors and about wet my pants.

I'd felt like a crook, then. I'd been ashamed.

But it wasn't as if there was only one copy of the will. And they were so

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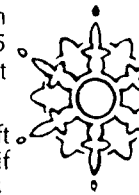

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wealthy they weren't going to miss those diamonds—their fortune gained and lost more than the worth of those diamonds every weekday in the stock market.

Those diamonds weren't stolen; they were salvage. A reward for recovering the old man's body, which would never have been found in the wreckage if not for me.

My glance fell on the envelope. That was the nuisance factor. If I'd just left that in his cool suit everything would have been fine. But he'd clutched it like it was so valuable.

I thought about old Dr. Nasser's wife—Rachel, was it? Rachel Karam. Thought about that look in her eyes when she'd asked what they had recovered from the yacht, the flickering glance she'd given me. She knew I'd taken the diamonds.

Then it hit me. In the letter the old man had said she had the only other copy of the will. So maybe it wasn't the *diamonds* she'd wanted to stay lost. Maybe she figured losing the diamonds was a small price to pay for the loss of an inconvenient will.

But what about the two who had witnessed the letter, the Jehenna and Ibrahim he'd mentioned? Surely they wouldn't ignore Nasser's wish to reinherit his own son. Maybe they didn't know the terms of the will. People didn't always know these things. Or had she paid them off, too?

Guesses, all guesses. But I had this feeling in my gut. She'd known what she was doing, what she was offering me. . . .

With a sigh, I scratched at my hair, rubbed my gritty eyes. I hadn't gotten half the sleep I needed over the last three days and I felt every minute of it. My week's nonpotable quota was mostly blown, too, so I couldn't wash off all the street grunge. Even this filthy I could sleep, though—could I ever.

But first a couple of jellophone calls, to find a merchant who wouldn't cheat me on my diamonds. And, out of curiosity, a quick log-in to the civic bulletin board, for a glance at the obits to see when and where the burial was. Just out of curiosity. Poor old guy.

THE SCREAMER, AGAIN

After a meager splash bath with a washrag and a few inches of tepid water in the sink, I went to bed early, before noon. That time when I heard the screaming again I knew it couldn't be real. It *still* kept me awake.

SHE LOVES ME

A weight settled on my bed. I woke with a start and struggled the sheet down, sheathed in sweat.

"Who is it?"

A dark silhouette blocked the strobing lights that shone through the curtains. The air was hot, close and still; the air conditioner had stopped working again. The silhouette bent down and buried its head in my lap, and I knew from the musky scent of her perfume who it was.

"I'm sorry, Rube."

I released my breath and took another. Then I reached out and touched the head in my lap.

"Me, too," I said.

THE LIGHT SLOWLY DAWNS

So what the hell, nothing good was

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on the JV and I couldn't do much else on a Sunday morning. So I geared Tiger up—Rachne being too conspicuous—and went to a funeral.

The ceremony started at 5:30 A.M., shortly before sunrise, at the American Reformed Coptic Church in Brooklyn, a venerable structure that used to be Episcopalian and easily holds a few thousand people. And it was a good thing, too, because the turnout was standing room only. When I-Tiger rolled up to the steps of the church at 5:06, the two ushers at the doors—who bulged out of their cool suits like Egyptian linebackers, and from my-Tiger's perspective towered several stories into the sky—were checking people's invites. A whole crowd of people milled around in the street and on the sidewalk, waiting to get in.

A lot of them got turned away at the door, mostly the press. I spotted the mayor and several celebs. The ushers let them through, naturally. I wondered what they'd do to a toy tank. Probably step on me. But hell if I wasn't going to try.

I-Tiger dodged heels, sandals, sneakers, and boots the size of meat lockers to the steps. Then I-he slid his taloned arms from their sheaths and planted them on the ground, turned on the spring motor, and started to rise, teetering on the arm stilts. The edge of the first step appeared at the top of my vision and gradually lowered till it was beneath my line of sight.

I put Tiger's purple plastic tractor treads in gear and then started to rock by contracting and relaxing his talons. I-he fell forward and retracted the arms, landed with a jarring bump, and teetered on the edge of the step before the treads grabbed hold of the concrete and carried me-him forward to safety at the base of the second step.

My gain was short-lived; the toe of a descending boot caught and lifted me-Tiger into the air. The world fell away, tumbling, and returned. With a crunch, I-he landed on his back on the asphalt and rocked to and fro like an upended turtle.

Annoying, but not a disaster. A systems check showed no damage; Tiger was built as a trainer waldo and is hardy as all get-out. With his arms and treads it was only seconds before I-he had righted myself-him. This time I scouted out an area less crowded. I-Tiger splashed through the gutter, climbed the curb, dodged feet, and struggled back up the five steps.

As I-Tiger neared the wooden doors, the Egyptian usher-guards loomed overhead like monster statues. I downshifted to Tiger's lowest gear ratio and accelerated, thinking, don't look down, guys.

They didn't have to. The instant I-Tiger crossed the threshold, a bell started chiming somewhere. Anti-waldo security systems. I flooded Tiger's systems with power and I-he veered away from the feet in the way, making for the chapel door.

The chase was short. A massive hand closed around me, and I barely had time to register the dark-and-orange of sunlight through flesh before the world appeared, tumbling again, and a baritone voice said, "No press allowed!"

Humiliating. As before, though, I-Tiger landed unhurt. I-he scrabbled back upright and made my-his slow and painful way back through the gutter, up onto

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the curb and up the steps. By this time the crowds had thinned out and they were closing the big double doors. The two usher-guards stood in front of it with their arms folded.

A glance around told me that I-Tiger wasn't the only waldo, nor the only one refused entrance; an assortment of different-sized boxes, gadgets, and mechanical bugsy-things hummed and buzzed and hovered around the doors amid the human reporters, television crews, vans, cameras, distance microphones, and the like. So I hung around outside with the press.

I could have looked for a side entrance, but breaking and entering wasn't too schick at a man's funeral. So I gave up the effort and positioned myself-Tiger near a window. I tinkered with Tiger's hearing focus and direction until I could make out someone's voice—the minister's, droning on about old Nasser's accomplishments.

There were lots of boo-hoos and noise like that. They did the same thing at my dad's funeral, brought in a mystic old fart who knew nothing about Dad to fling holy water and make up a bunch of lies about what a family man he was. Assured us all that he was up there smiling down on us so we shouldn't feel bad that he'd junked himself out on rage one too many times, and had a brain hemorrhage in the middle of one of his disk-breaking rampages.

Maybe all that stuff about Nasser was true. If it was, he deserved sainthood or something. They left out the part about how he'd tossed his son out and Christ knows what else he did. Funerals piss me off.

But I didn't have the heart to stay mad at the old man. He hadn't asked to be crushed in a bombed-out building. So I-Tiger bumped around on the sidewalk outside the stained glass and hewn blocks with the rest of the rejects and bided my time.

Eventually the usher-guards received some signal and opened the doors of the church. The press—and I-Tiger—crowded around.

The minister came out first, an oldish jowly man with yellowed skin, a large nose, and dark, deep-set eyes, in a black robe with a hooded cowl. The IR plume that billowed out behind him must have been from a hidden cool vest. He had white linens draped over his arms and around his neck, and he swung a brass crucifer on a chain in a slow and steady rhythm. At the peak of each swing a puff of smoke appeared. A couple of light-skinned guys in tasteful pinstriped cool suits followed him, mortuary types, each with his hands clasped in front of him, each wearing a patronizing smirk that was probably supposed to be serene.

Next the pallbearers came carrying a coffin of mahogany and silver covered with wreaths of flowers that were only just starting to wilt. I stared. *Man* was this guy loaded.

Then came the old man's wife, Rachel, with a younger female companion at her arm who looked a bit like her only less made over. Rachel wore not a cool suit but a plain black dress in the *natureil* fashion, made of gauze layers with loose sleeves and a filmy black shawl over her head. She had no cool vest IR plume, either. My respect for her went up. It was 114°F and 82 percent humidity this morning.

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A lot of the people who filed out were crying. I spotted Captain Nanopoulos, looking self-possessed, if a little preoccupied. Her sandaled foot went down next to me-Tiger and I had to resist the urge to make a crack or call out a greeting.

The minister and the pallbearers-with-coffin entered the cemetery through a wrought iron gate, followed by old Nasser's wife Rachel, her companion, and a tall, athletic-looking man maybe a few years older than me, about thirty or so, in the burlap robes of a Forest Veils monastic novitiate. His eyes looked raw with shock and his head was shaved.

That had to be Sidra, Nasser's son—he was the only young, black male who was granted entry to the burial. I wondered whether he had refused the role of pallbearer or whether Rachel had simply not asked him. Wondered whether he cared.

The burial was family and close friends only, the obit had said so. Still, it was a shock to see the guards at the gate turn away the mayor and the film and stage stars. They did let Nanopoulos in, which pissed me off again. I'd busted my ass and ruined my Golem trying to rescue him, and it was some cop who got to go to his funeral.

Others I didn't recognize also entered, including a dozen or so women dressed in black gowns and veiled faces, who entered the cemetery in pairs, fingers over their mouths under the veils. They swayed as they walked and wailed almost like the cries of sea birds—a sorrowful, minor-key song. Their cries gave me chills; it was too much like how the screamer sounded.

Most of the rest who entered wore their wealth like advert strips: cool suits, polymer-treated hair, face paint and hair glows and sparkles. Maybe they'd dressed down from their usual for the funeral, but it sure didn't show to my eyes. Then the guards closed the gates and fended off the people and waldos who crowded up to the wall of rock and iron.

Just down from the cemetery was an abandoned tennis court; I'd seen it on my way over. I-Tiger broke away from the crowd, entered the court and bumped across the cracked concrete to the backstop, a thirty-foot fence of chain link. None of the press had followed me. I-Tiger extended his arms, grabbed hold, and began to climb.

Tiger's talons weren't designed for climbing fences and the angle was bad, but I put my years of experience with Golem to good use. I-Tiger scrambled, clunked, and ratcheted up the chain link at an agonizing crawl: a crippled, bow-legged mechanical rodent.

From about twenty-two feet up, the burial was visible. I-Tiger zoomed in.

A concrete structure—a tomb, I guess you'd call it—was built into the ground on a small rise, obscured from the road by a stand of palm trees. The pallbearers were lowering the coffin onto a chrome-plated, robotic gurney before the tomb. The gurney was mounted on some violently green astroturf put there to hide the piles of fresh dirt. The mourners were seating themselves with their backs to me on antique walnut chairs with black velvet-cushioned seats, on a carpet of plush crimson that had been spread before the coffin.

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The minister stood between the coffin and the tomb with his head bowed and a bible in his hands, and the two men in pin-striped cool suits, attempting to be discreet, moved over to flank him. The women in black stood to the side, still trilling, wailing, and moaning.

The minister looked up at the people then, with a look of faint surprise like he'd thought he was alone. Then he lifted a hand and the women in black fell silent. He lifted one of the linens draped over his sleeves, kissed it, and then laid it on the coffin. Then he opened his bible, licked a finger, and flipped a page or two. He read, glancing up occasionally and holding his place with the finger. I tuned and focused Tiger's hearing.

He read the "yea, though I walk through the valley of the shadow" scripture—always a popular favorite at funerals. Then he flipped pages again.

"Let us pray," he said. Heads bowed. "Seven archangels stand glorifying the Almighty and serving the hidden Mystery. . . ."

I scanned the mourners while he went on. Nanopoulos acted like she was really paying attention to the minister, but Rachel kept glancing back at Sidra, like she couldn't resist. I thought it was pretty rude, she being the deceased's wife and all.

" . . . the four living creatures bearing the chariot of God," he said, " . . . Heaven and Earth . . . praise him without ceasing . . . Holy is the Almighty; give rest to the departed. Holy is the Immortal; bless thine inheritance . . . Holy, holy, holy . . . Heaven and Earth are full of thy glory. Intercede for us O angels our guardians, and all heavenly hosts, that our sins may be forgiven."

Sidra sat in a chair near the back. At the words "that our sins may be forgiven," he shot the minister a single, dreadful look. He'd chosen a seat far from Rachel and didn't look at her; I couldn't figure out whether her glances were aggressive or whether she was trying to catch his attention.

I-Tiger zoomed on Sidra. His black skin was grey with pallor, and he swallowed hard a couple of times. His fists clenched and unclenched in his robe.

After the minister finished reading, one of the men in the pin-striped cool suits came up and touched a button on the chrome gurney. Steel talons came out from underneath and gripped the coffin, and the gurney rolled into the darkness of the tomb. With Tiger's IR I-he watched the gurney slide the coffin onto a concrete slab at the tomb's side. The minister was talking again.

" . . . it is written, the Lord is my light and my salvation. Yes, Lord, draw me to thyself. Thou art a faithful God, a merciful Father, the giver of all that is good, and the instructor of the heart."

The gurney rolled back out and hunkered down in its original place. The minister closed his book with rather too loud a noise, and said, "May the soul of Youhanna Nasser rest in peace in the kingdom of our merciful Father in heaven, now and forever more. Go in peace and remember him. Amen."

"Amen," everybody else muttered.

As if on cue, the women in black started wailing again. The rest of the mourners stood. Rachel walked up to the tomb, looked inside it for a second, and then said something in Arabic, I

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guess it was. Then she turned to bury her face against the shoulder of her companion. Except for the women in black, who remained at the tomb, wailing enthusiastically, the other mourners wandered away, talking quietly or silent.

A short distance away Rachel and her companion turned to watch Sidra. He had stayed seated, looking at the unfinished tomb. Then he stood up and strode in my general direction looking, if anything, angry.

I-Tiger picked up a faint, "Go after him, Jehenna," Rachel gave her companion a nudge and the younger woman ran after Sidra. Then Rachel dried her eyes, turning to the group that had gathered to speak to her.

It took me a while to locate Sidra and the woman, Jehenna, among the trees and tombs. They were moving more toward the back of the cemetery now, side by side, disappearing and reappearing among the palm fronds and stone tombs and statues of angels.

"She means it," Jehenna said.

He held up a hand like a traffic cop, with a sharp shake of his head.

"Don't," he said, and Jehenna closed her mouth on what she'd been about to say. "Don't lie to me. I don't know what you two are trying to prove but I know quite well how much Rachel hates me."

"You're wrong, Sid."

He gave her a raised eyebrow. "Oh, am I?"

"Yes. She resented you once. But it's ancient history now. Everyone's forgiven and forgotten those days but you. Why can't you believe that?"

He gave her a skeptical look.

"Listen to me." She touched his arm. "She sent me to you. She wants you there to help mourn Youhanna, and so do I."

"I can mourn as easily with the people of my faith."

"They never knew him."

"No, but they know me."

"They're not family!"

"They are *my* family."

Jehenna templed her hands and pressed them against her lips, studying his face. "All right, then, come for another reason. She's going to sell *Aïn el Baraka*. Come help us put the house in order."

He looked shocked. Then he shook his head. "Why are you going to all this trouble? Why don't you leave me alone?"

"I told you. We want to make peace."

"Why should I help you sort through *his* things? Hire help, if you need it."

Silence followed. I couldn't tell what it meant because they had moved behind a blur of green palms and bleached-white tombs. When they didn't appear where their trajectory should have led them, I knew I'd lost them.

Shit. I cranked Tiger's volume up and scanned . . . nothing but the chirps and rustlings of graveyard birds and rodents. They must have stopped moving or gone off in another direction.

A flicker of movement caught my eye amid the palm leaves near where they'd first disappeared. I honed in—and got Jehenna's voice like ice picks, stabbing right into the ears. I nearly levitated—I yanked the lead out and was home again, thrashing, my own yell still echoing in my ears. Melissa came out of the

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kitchen holding a soapy plate in dripping hands, a questioning look on her face.

I gave her a rather sickly smile. "Volume too high."

She shook her head at me, looking mildly disgusted, and went back into the kitchen. Trembling, I lowered the volume manually with a flick of the control switches, and then plugged back in.

" . . . see that you receive something," Jehenna was saying. "She tried to get Youhanna to change his will to include you, you know, near the end."

It took a second for me to understand her remark. Then I got mad. You liar, I thought. He did change his will. He changed it.

By this time they had reappeared. Sidra gave her a hooded look. "I don't need his money. I have my faith to sustain me."

"You deserve to receive something to remember your father by."

He said nothing but his lips were trembling.

"You owe it to him," she said. "Come and spend some time with the family, mourning him properly."

"He kicked me out!"

"Yes, and when he tried to reconcile with you, *you* shut *him* out. Whose fault is that?"

God damn you, I thought. He is in his father's will and you know it.

Sidra, of course, couldn't hear me. He gave Jehenna the same ghastly look he'd given the priest earlier. Then he seemed to deflate. He covered his face.

"Not in his will?" Sidra said. His voice wavered. "Not in his heart." He wiped at his eyes and drew a breath. While his head was lowered she watched him like a cat waiting for the bug to move. Then he lifted his head and met her eyes.

"All right, then. Tell Rachel I'll come tonight. I need a few hours to go back to the monastery to inform them, and pack some things—"

"No." At his look, she softened the word. "No need. We have everything you need at *Aïn el Baraka*. Call your people from the house. Take the limo with us. Everything's arranged."

They headed back toward the front of the cemetery. Meanwhile, I-Tiger clung to the wire like a cat stuck up a pole while I tried to figure out how to get down. I-Tiger tried a couple of angles and holds, but it plain wasn't going to work.

What the hell, I thought. I-Tiger retracted his arms. The world fell up and I-he hit the concrete hard enough to bounce twice.

The Sun, engorged on smog and ozone-laden haze, had slipped above the tiled roof of the church by the time I-Tiger had struggled onto his treads and rolled back out to the street. The crowds outside the cemetery were thinning; collocars choked the road and a shouting chorus of car horns had begun. A dust devil spun down the street and I couldn't tell if those screams I heard were the cries of the women in black or if I was imagining things again.

Well, it wasn't my problem. But her lies really burned me. *Everything's arranged*. I'll just bet it is, I thought. I'll bet you've taken care of every little thing.

THE DEATH GRIP EASES

I really couldn't send Rachne to sell

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the diamonds, much as I wanted to. So that night I got dressed up and went out again.

I built up as much speed as I could going down the stairs so as not to get stuck at the outer door again. It didn't help. I still stalled when my hand touched the grip and an invisible hand closed on my throat so I couldn't breathe. My heart started to race.

Let me go, I told the hand. We're out on the street tomorrow if we don't pay the rent. I have to go out, now.

I may as well have been talking to a rock. So I shut up and fought. My arm began to tremble. Mingled tears and sweat dripped down my face. Nothing.

We need money, I thought. The diamonds—they're my one chance to change things. I can change things if I get out there—but nobody else can do it.

This once. Please.

And slowly, slowly, the death grip eased—just enough for me to pull the door open, and bull my way out past the paralysis.

SERIOUS SHIT

The electronic lock buzzed and I pushed the door inward. The air inside Hammond & Hammond, Jewelers, Ltd. stirred, noticeably less hot and oppressive than the night air outside—bitter, smelling of solvents and must.

The room's only light spilled from glass cases that encircled the walls. A white man with splotches on his forehead pushed the sleeves of his baggy linen shirt above his elbows and flipped up the lenses of his jeweler's specs to look at me. He sat behind one of the glass cases, wearing a bow tie of grey paisley silk and a pin-striped cool vest. His gaunt, beak-nosed face was lit up from below, which made him look kind of jade, satanic even, and it was all I could do to stay rooted.

"Yes?" he said after a pause. "What can I do for you?"

Hammond & Hammond were reputable diamond merchants, small volume, and most importantly, Bostonian. I'd decided no way I was going to try to sell the diamonds to a New York merchant. Never mind what cheats New York merchants can be; I didn't want anyone in town connecting me with the diamonds.

I was probably overdoing it with the caution. After the talk between Jehenna and Sidra, I knew without a doubt that Rachel Karam had meant the diamonds to be a pay-off and that she hadn't reported them missing. But I wasn't about to rely on her continued good will.

A bullet train, round trip, New York to Boston, took fifty-four minutes each way and cost $264. That left $17.42 in my account, which would buy me a dry scone and lemon in my iced tea. And if Calen didn't have the rent today he'd have Melissa's and my ass. This deal had better go down or I was in serious shit.

I came up and leaned on the counter. The jeweler frowned at me, eyebrows bristling. The way he perched on his stool he reminded me of a carrion bird, hunched over his elbows on a wooden work table whose surface was worn and gouged, scattered with bits of wax and slivers of gold. The table had a miniature vise mounted on it, which held a clear, dark green, faceted jewel in a gold setting. A cabinet with many tiny drawers of transparent plastic sat at the

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back. An abstract shape in red wax, a blue plastic squeeze bottle, and several interesting-looking tools lay on the table.

"Hi." My voice quavered. Damn it. "I need some assistance."

"Please don't lean on the counter," he said, still frowning, and pointed to a sign with small, neat letters by my elbow: *Do Not Lean On The Counter.*

"Oops." I removed my elbows from the counter with an apologetic grimace and unfolded the handkerchief to reveal the smallest pair of diamonds. I'd hidden the rest in a drain beneath my tool cabinet, and had added the cross and the will for good measure. That screamer was making me jumpy as hell. Or maybe it was my guilty conscience. I was getting downright paranoid.

"I need to know what these are worth."

The jeweler's frown disappeared. He flipped his magnifier specs down, turning his eyes to enormous, blue ceramic marbles, and with his pincers gripped and lifted one of the diamonds. When he swung his light over it, the reflections in the stone burned my eyes like pinpoint lasers. Rainbow-tinged flecks of light dotted his face. He didn't look nearly so intimidating and vulture-like without the frown. He took a reading from the LCD on his pincer handle, then set the first one down.

"One-point-one-two carats," he said, and picked up the second one. "And one-point-one-one. Now I should like a moment to verify that they are natural stones and to examine their clarity, color, and brilliance."

I caught my breath while his balding head bent over them. Noises ensued: mmms and ahs and oh?s. His knobbly hands had stains on them. He laid each diamond in a box, sealed it, and took readings from the LCD displays on the outside.

"The carbon 12-13-14 ratios indicate that these are natural stones," he said. "Outstanding quality, too. Outstanding." Then his hand flipped up the magnifying lenses again, and he gave me a speckled blue, inquisitive look.

I adjusted the hood of my drape—I'd pinned it with at least ten fasteners to keep it from slipping off and exposing my beanjack, but couldn't help being paranoid about it anyway—and said, "They're an heirloom."

I managed to say this without stammering, mostly because I'd practiced on the bullet train down. Even in my one nice outfit, my tangerine drape with the garnet brooch and my hair polymer-waxed in short ringlets and some of Melissa's paints tastefully applied to face and neck, I felt cheap and unconvincing. But I figured an ounce of moxy can overpower a ton of common sense. Besides, for disguise, the bird-of-paradise swirls of tangerine and emerald sparkling on my forehead, eyelids, cheeks, and chin did even better duty than a cool mask.

"I need to insure them," I added. "I wanted an outside opinion before I went to the insurer."

"Ah, well. Hmmm. Of course." The eyebrows, bushy mustachios over his eyes, went up and down a couple of times while he examined the diamonds through his lenses again. I eyed his displays distractedly and chewed my cuticle. Say, I thought, can I borrow your bathroom? I need to throw up.

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"Insure them for at least one hundred eighty thousand apiece," he said finally. "That would be replacement cost. The insurance company's appraiser will give you a more exact figure, but anything less than that and you'd be unable to replace them at retail."

A breath dragged through my teeth. He smiled at my gape-mouthed stare and pursed his fleshy lips.

"They're absolutely flawless, young woman, as clear and brilliant and colorless as you'll find anywhere in a natural stone. Free of impurities or cloudiness of any kind. And the cut is excellent. Top caliber. I haven't seen work this good in a long time. You won't have any trouble insuring them at that price."

"But what if I were to sell them—"

I broke off when he started nodding. "I was coming to that. If you were to sell them you'd get a good deal less than three hundred sixty thousand—unless you were lucky enough to find a private buyer willing to pay retail price for them."

That was a pretty clear way of telling me which of us would be making the profit in a transaction. After a moment, I said, "If I wanted to exchange them for one double the size—of the same quality—"

He was shaking his head already, anticipating my question. "You couldn't, not without paying more. The larger they are, the more rare they are, so the price goes up more rapidly than the size.

"A two-carat stone of this quality would be—I'd estimate, oh, close to half a million dollars, retail. Possibly more."

Which meant I owned several million dollars' worth of diamonds. Holy shit—I'd been carrying them in a hanky like they were pebbles.

The band of muscles around my chest tightened till I could barely breathe. I held out the hanky with a trembling hand. He gave me a smile. My heart lurched when he reached under this counter—I half expected a gun—but he brought out a jewel box, a black matte vinyl job with "Hammond & Hammond, Jewelers, Ltd." scrolled on top in gold letters and folds of black velvet on the inside.

He popped the lid and dropped the diamonds onto the velvet. When he pressed the box into my hand his face had a rather wistful look. A good sign. I closed a fist around the box and swallowed.

"Good night, then," he said, flipped his lenses down, and turned back to the green jewel in the vise.

I leaned forward on my toes and cleared my throat. "Would you, perhaps—"

"Yes?"

"I was wondering whether you'd be interested in making an offer."

He raised his formidable eyebrows at me and pushed out his lower lip till it looked like a blister about to pop. "Indeed? Well, Ms.—"

I'd prepared for that one. "Jamison."

"—Ms. Jamison, I'd say yes, we'd be interested in discussing a possible sale. You understand, of course, that we'd be unable to give you anything close to the retail price I quoted. . . . Otherwise we'd have no real incentive to buy them, because we'd be tying up capital without being able to

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make a profit on the sale."

"Of course not," I said. I opened my hand again, flipped the box open, and set it down on the counter in front of him. "So what kind of price *would* you offer for diamonds of this high a quality?"

He gave me a wry look, then sucked his lip back in and glanced at the diamonds with a slight frown. He wanted them; I could tell.

"Oh, I don't know," he said, and picked up the diamonds to scrutinize them.

"They go well as a pair," I said, "Don't they? I expect that makes them more valuable than each would be separately."

"Mmmm. Could be." He dropped them back in the box, set it down just beyond my fingertips and met my gaze. "What would you be wanting for them?"

I chewed my cuticle again. I know how to drive a bargain, but I know junk a lot better than I know diamonds. Besides, I hate bargaining in person. When I deal with salvage clients it's always in waldo—they can't read me that way. If I could have gotten away with it this time I would have, but there was no quicker and better way to be ID'd than to teeter in on Rachne's legs. Or worse, to come in my poor Golem. So I was stuck with my own scared and trembling body for one of the most important deals I'd ever be likely to strike.

Moxy. Think moxy.

"Certainly I can understand your wanting to make a profit." I said. "On the other hand, I wouldn't want to dishonor the memory of my great aunt by selling her diamonds at a bargain basement price. She brought them with her from Europe, you know." I pinched my lip and pretended to mull things over, looking at the diamonds. "You quoted three hundred sixty kay for the two of them. I'll let them go for three hundred kay. You'll make sixty thousand, free and clear."

He seemed alarmed. "No, no. You clearly don't understand the diamond business. That low a profit is not even worth considering. Diamonds in that price range do not turn over quickly. To tie up so much capital for such a marginal profit would be insane—and who knows what the diamond market will do before they sell? No, we couldn't possibly give you more than one hundred thousand for the two of them."

I choked on an outraged noise. "Excuse me—I can't have heard you right. One hundred thousand—that's robbery!" I'd found my barter voice; that last came out without even a twitch of an eyelid. "I couldn't possibly take less than two hundred eighty kay."

He sighed, much put upon. "One fifty."

"Two fifty."

He studied me for a moment, looking thoughtful. "You drive a hard bargain, young woman."

"I owe it to the memory of Aunt Tillie, sir. She'd do back flips in her grave if she thought I'd taken less than half what they're worth."

He sighed again and his glance went to the diamonds. He was trying to be chill, but he wanted them.

"One hundred eighty," he said reluctantly, "and my partner will contract ulcers when I tell him."

I refrained with great effort from

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chewing my lip. Christ, Ruby, take it! But I had a drop of Scottish blood in my veins.

"I couldn't take a penny less than two hundred kay, sir."

He shook his head, harried and victimized. Then he blew air out with his cheeks puffed up; I'd read him right. "Let's split the difference. One hundred ninety thousand dollars for the two of them. That's the best I can do for you."

I gave the diamonds a wistful goodbye, and pushed the box toward him. "You just bought yourself some diamonds, sir."

A grin spread across his face; he poured the diamonds into his hands and rolled them between his fingers. "Give me your account number and I'll transfer the funds immediately."

"Um, actually," I said, "I'd prefer cash."

Something changed in his face. "We don't deal in cash."

My stomach sank like a lump of lead in water. But I stoked my moxy, put on an innocent expression, and met his eyes.

"I don't want my parents to know I'm selling Aunt Tillie's diamonds," I said. "Don't get me wrong; they're mine to sell. But if my parents knew they'd insist on buying back the diamonds and paying my bills for me and I don't want to owe them—"

But he was shaking his head. He dropped the diamonds back into the box and there was a look of finality on his face.

"I'm sorry, Ms. Jamison, but I'm afraid I can't help you. First you tell me you need a price for insurance purposes, then you offer to sell the diamonds, then you'll only take cash. That sort of thing—well, we bank on our reputation and we can't afford trouble. You'll have to take your business elsewhere."

"What?—"

"Take your business elsewhere." He turned back to his table.

With a curse and a glare that was lost on him, I snatched up the diamonds. I slammed the door open on the way out, hoping it would break.

Heat slapped me in the face and burned like caustic in my sinuses and throat. I dodged cars across the street, matched speed with the slidewalk that headed into the downtown environment canopy, and jumped on, shoving my way in among the jostling crowds. Hammond & Hammond wasn't the only jeweler in town.

Fact was, though, moxy or no, I never could lie worth a damn.

DECISIONS, DECISIONS

On the train back home I stared out the window. A hypnotic stream of blurred images jetted past—streetlights; a trash fire in an empty field that belched dark billows of smoke; crowds on piers with cars and boats; a shimmering, colored chaos of envie canopies; gutted, ancient buildings collapsing on themselves in ultra-slo-mo.

At two other local jewelers I'd gotten no further than I had at Hammond & Hammond. I'd hoped H&H was just being particularly anal, but no one in the jewelry trade deals in cash any more and my request just made them too suspicious—and I'd come way down on my price, too. So I was stuck with these two incredibly high-quality diamonds in

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my pocket, more wealth than I'd ever had, that I practically couldn't give away.

Blending with the stark orange city glow to the south, a gentle rose light was spreading above the skyline along the eastern horizon. And Calen wouldn't wait much later than sunrise to send in his odd squad of furniture-moving relatives. Hello, homelessness. I was wealthy as sin, and about to be kicked out on the street.

I couldn't let that happen. Melissa and I were going to have a talk about that stash of hers and whose turn it was to pay the rent.

SERIOUS SHIT, CONTINUED

I opened the door to the apt.

"Melissa," I said, "we have to talk," but by that time my momentum had carried me into the main room, and the words got stuck.

Melissa squatted on the floor of the room with her back to me, in the midst of disaster and debris. Her bag of money was in her lap and the hole by her feet was unboarded. She was talking but I didn't register it. I was too busy taking in the damage.

The bookcases had been knocked over—Melissa's and my books lay scattered across the floor like the corpses of birds: pages plucked loose and strewn like feathers, spines broken. All the posters and photos had been torn down from the walls. Pieces of Melissa's mirror clung in jagged glassicles to its posts, and the pteranodon mobile swung gently to and fro above the air conditioner, smashed to toothpicks.

And my equipment—all my scrounged, inspired brilliance, my cannibalized and jury-rigged hardware. All those years of labor and love. Smashed to jesus. Wiring, screws, bolts, and glass were strewn across the bed, squish-couch, and floor.

Deep gouges had been slashed in the bed; clumps and strands of cotton stuffing hung out of the gashes like handfuls of entrails. The squish-couch bled liquid in a puddle on the floor. The shelves of computers and amps had been pulled loose and the housings smashed, the delicate innards crushed and battered.

And Tiger—I'd left him under the bed. He lay, broken soldier, beneath a corner of the bookcase—shattered plastic, bent gun, exposed metal guts.

Calen's squad had beat me home.

I crunched across the floor, picked Tiger up, collected his innards, and sat down cradling him in my hands. I brought him to my chest and started to rock him back and forth. Melissa laid a hand on my shoulder. Something ice-cold and clammy touched my shoulder blade—I jumped and she jumped. Then I got a good look at her.

"Christ," I said. "What happened to you?"

She raised a baggy full of water and porous lumps of ice to her reddened, swelling cheek. Her other arm was wrapped around the jello-tube, whose black glastic base was cracked. She handed me the jellophone transceiver. A digital ghost face in the jelly, a simulacrum with hollow silver eyes, stared out at me from under her armpit.

A ghost face. This was getting too jade. I started to hear the screaming again, somewhere, and I was ready to join in at the chorus.

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"It's for you, honey," she said, with a strange note in her voice, and handed me the jello-tube. I laid Tiger aside amid the cotton wads and took the jello-tube into my lap. The simulacrum's expression hadn't changed, no big surprise.

"Calen," I said, "don't bother with the ghost face. We know it was you, and our next call is to the Tenants' Legal Co-Op. You're dead meat."

"You are mistaken," the ghost face said. "I am not Calen."

It had the typical ghost voice, an androgynous sing-song, a mechanical voice with alien inflections. A client with a thing for privacy.

"Then call back later. I've got a problem on my hands." It was no way to talk to a client, but I was in no mood. I started to hang up.

"I know about the diamonds."

"Excuse me?" My hand hung in midair, halfway to the cutoff button.

"I want the envelope you took, or the police will hear about the diamonds you stole."

I recoiled and drew a sharp breath. I looked over my shoulder—Melissa had gone into the kitchen and stood at the refrigerator. Ice cubes rattled against plastic; she was getting more ice for her eye.

"Who are you?" My voice betrayed me—the words came out more air than sound.

"Who I am doesn't matter. Do as I say and you may keep the diamonds; you will hear nothing more from me. Fail to, and the police will receive an anonymous call."

I brushed my hair back. Rachel Karam. It had to be.

"I'm listening," I said after a moment. Melissa came back into the room.

"Here are your instructions. I will give them only once."

"Wait!" I looked around for a computer to enter the instructions to, but everything had been destroyed.

The ghost was already talking. "Take the envelope, and a roll of adhesive tape, and go to the Manhattan Midtown Scramport."

"Manhattan Midtown Scramport. Envelope and adhesive tape."

"Correct. Be there before midnight. Rent a locker. Lock the envelope inside—"

"Any locker?"

"Any locker. Lock the envelope in the locker and proceed immediately to Grand Central Station with the key. Go to the women's restroom near the Forty-Second Street exit."

"Women's restroom, Forty-Second Street exit."

"Correct. At the restroom entrance, face your right, go to the last stall on the right-hand side and tape the key to the trunk of the toilet, at the very back. Make sure nothing is visible from the front."

"Tape the key inconspicuously to the commode in the right-most corner. Right."

"Then leave."

"OK. Then what?"

"If you follow these instructions exactly, that will be all. You'll never hear from me again. Any deviations will result in your exposure and arrest."

I bit my lip to keep from spitting out a retort. Something like, *and how would you explain the will, then, Rachel?*

"You bet," I said. "Whatever you say."

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* * *

PARANOIA PAYOFF

I was out the door and taking the back stairs three at a time before the ghost face had had time to fade from the jelly. The basement was as dark as a tomb, hot and musty. I flipped on the light, stumbled down the stairs, and made my way through the storage piles and decaying boxes to my cubicle.

Golem and Rachne stood in opposite corners of the nook, untouched. The metal lockbox with my backup copies of Golem's, Rachne's, and Tiger's linkware was also untouched, and the tool cabinet looked exactly the same, too.

Of course; Rachel wouldn't have had to call otherwise. But I wasn't satisfied until I'd dug out a screwdriver, dragged the tool cabinet out of the way, unscrewed and removed the drain cover with the wire hanging from it, and pulled up the baggy tied to the wire's other end. My heart pounded against my ribs; I sat down on the concrete floor with the baggy in my lap and trembled.

Breathe, Ruby, I told myself, pressing a hand against my rib cage, breathe. Inside the baggy, the gelpaper envelope with the six remaining stones, the note, the will, and the cross were still there. Sometimes it pays to be paranoid.

"You want to tell me what's going on?"

I looked up and there stood Melissa at the arch of my storage cubicle, ice on her eye and hand on her hip.

I CAN EXPLAIN EVERYTHING

She looked more confused than suspicious. I convinced her we should talk upstairs. I dropped the baggy into one of my pockets and we went up and sat on her bed.

"You OK?"

She nodded with a sigh, and lowered the baggy of ice. "Just shook up."

"You're going to get a shiner," I said, and touched her cheek lightly, inspecting it. The skin was cool, with beads of water on it from the ice. The bruise was close to the eye and already turning purple in spots.

"Yeah." She flashed me a smile that gave me gooseflesh. I found myself leaning toward her and drew my hand away. Then her expression grew sober. "Calen didn't do this. It was a security waldo, and he hasn't got the money to hire one of those."

"Yeah."

"It broke in and started searching the place, smashing things. When I tried to call the cops it knocked me against the wall. It finally left. I don't know what it wanted." She gave me raised eyebrows. "Why would anyone hire a high-tech waldo to break in here, of all places?"

"Mmmm," I said. I didn't want to meet her eyes, so I went into the kitchen and got the broom and dustpan out of the pantry.

"Ruby?"

"Mmm hmm?"

"I get this feeling you know more than you're letting on."

I started sweeping and didn't answer. I could feel her gaze on me.

"I want to know what's going on," she said. "Who was that on the phone, and why did they threaten to call the police? Why did they send a waldo after you? They wanted what's in that baggy you pulled out of the drain, didn't

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they?"

I kept sweeping.

"Ruby, are you into designers?"

Drugs, she meant. Designer drugs. I stopped sweeping and met her gaze. "Never."

"Then what?"

I gave her a long, hard look. But she'd seen and heard so much already; what else could I do? I sat back down on the bed and pulled the baggy out. On the bed I laid out the cross and chain, the envelope with the Arabic writing, and the note. The diamonds tumbled out last, flashing in the light. Her eyes got wide and her hands went out—she snatched the stones up.

"Diamonds! Christ. Synthetics?"

I shook my head. She poked at them with a finger. "My God, if these are natural diamonds they must be worth millions. Where did you get them?"

When I didn't answer, her eyes got still wider. "You stole them, didn't you? That rich old envie man you found the other night." She stood up and started to pace. "That, what's his name—I saw him on the news. Nasser. You stole these from him. Are you *crazy?*"

She yelled this last in my face, shaking her fist which still had the diamonds in it.

"Quiet down," I said, thinking about the neighbors. I might as well have been speaking Arabic.

"The police are going to be all over us! Shit, Ruby, you're out of your mind!" Then she covered her mouth with a gasp and gave me a look that made my skin creep. "Did you kill him for these?"

"Thanks for the vote of confidence."

"Well, what am I supposed to think?"

"Try stop jumping to conclusions. If you'll sit down and let me talk I can tell you what happened."

She gave me a look like she didn't want to get too close, but she finally perched on the edge of the bed. I told her the whole story, exactly as it had happened. When I got to the part where Rachel had shown up at the police station Melissa shook the fist full of diamonds at me again.

"Are you trying to tell me that woman would fail to report these as stolen?"

I had this powerful urge to sit on her and wrestle the diamonds out of her hand. Instead I pulled out the note, which she was half sitting on.

"Read this," I said. "Sidra's his son. This was inside the package the old man was trying to deliver when he got shipwrecked."

Her expression grew confused as she read, and then thoughtful. Then an expression came onto her face that made my guts squirm. She lay the note down on my knee and fingered the diamonds in her hand, and then looked up at me with a smile that had relief in it and, well, something calculating.

"She doesn't dare call the police," Melissa said.

"No," I agreed, "she doesn't."

She jumped up with a whoop and clutched the diamonds to her chest. "Then don't you see?—we're home free! We're rich, Ruby! It's a miracle. Oh my God, I never thought this could ever happen—"

She went on in that vein. It sounded distressingly familiar. I pulled out the

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Hammond & Hammond box with the two smallest diamonds and looked at them while she carried on. I put the note, the will, and the cross back into the big, de-gelled gelpaper envelope and stuck it in my pocket.

The screamer was still going at it, very far away, and I went over to the window and leaned on the sill. Over the tops of the buildings the air shivered and smoked with thrown-off light and heat.

I thought about my dad—a sneak, a thief, someone who terrorized his children and wife, and oh-so-mealy to anyone with a nanospeck of influence. A fine example of someone who bullied people and stole from them and didn't care who got hurt as long as he made a profit.

The old man, Nasser, he'd been rich, he'd been an envie. Maybe he wasn't the saint they made out on the nets, and maybe he wasn't the world's greatest father, throwing his son out. But he'd tried to help people, he'd tried to do the right thing it seemed like. And the screamer's voice rolled out so sad, so filled with despair, like he knew no one would hear him, no one would do right by him; no one had to.

That's when I recognized his voice.

"Rest in peace, old man," I whispered. "I understand."

And as the words left my lips, the scream started fading, slowly, the way a siren dies. The silence it left behind soaked right in through my pores and I felt calm for the first time in days—for the first time, in fact, since the skyscraper fiasco.

That more than anything made my mind up for me. I let out a slow, deep breath and turned.

Melissa had fallen silent. She gave me a quizzical look. "You look like you saw a ghost."

"I've been hearing one," I said, and held out my hand for the six diamonds. Her face struggled through several expressions. Then she dropped them into my palm, one by one. I put them in the box with the smallest pair.

"What are you going to do?" she asked. Her voice was very small.

"I just saw on your face what's been in my heart," I said. "And I don't like it." I dropped the box into the pocket with the envelope. "These aren't ours. They belong to Nasser's son—or whoever he left them to in his will. The will—*damn it*." I dug fingers into my hair. "What am I going to do about the will?"

"Listen to me." Melissa took my hands and stared into my eyes. "Listen. They aren't going to miss those diamonds. No one will know. You can't"—I wrenched loose from her and her voice rose in pitch—"you can't just throw them away! *God damn you!*"

"Melissa . . . "

Her face changed again. "I'm sorry, hon. I'm sorry. It's just so much money—I got a little crazy."

She walked in a tight circle like a pent-up animal. Then she came up to me and looked at me with haunted eyes, a travesty of a smile on her lips. She lifted her hands and cupped my jaw.

"It's OK," she said. "I'm OK now," and then she pulled me to her and kissed me, hard and deep, her tongue flicking at my teeth, her hands writhing in my hair.

I pulled away, drew a sharp breath.

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Tears filled my eyes. That kiss had had knife-blade steel in it.

Her hands dropped to her sides. "I thought you wanted me."

"It doesn't even have to have a penis, does it? Just money."

"Ruby—"

I shook my head, half blind with tears, and stumbled to the door.

"Wait! Where are you going?"

When I looked back she was standing in the midst of the wreckage, her face ashen. "You can't just leave!"

"I have to." I just stood there, though, rooted to the spot, unwilling to leave. Then my glance fell on her bag of money, lying forgotten on the floor. "I've been meaning to tell you, Melissa, it's your turn to pay the rent."

We stood there and stared at each other. Then, not knowing what else to do, I stepped out and closed the door most gently behind me.

The outer door caused me barely a moment's hesitation. I guess you'd call it progress. ■

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John Gribbin

WHATEVER HAPPENED TO THE LITTLE ICE AGE?

Is the threat of global warming caused by a buildup of greenhouse gases real? Or are recent temperature fluctuations due to changes in solar activity, with a new mini ice age on the way? Depending on which newspaper reports you read, you could be excused for believing either option, or for giving up in disgust and concluding that climatologists don't know what they are talking about. But hang in there just a little bit longer, and I hope to be able to resolve the confusion for you, and point to the real climate threat.

The problem, for outsiders baffled by conflicting reports that have emerged from the scientific experts over the past ten years or so, is the respectability both of the idea that cold spells in recent history may have been linked to changes in solar activity, that such a cold spell is now due, and the more recent realization of the threat of global warming caused by the greenhouse effect. More accurately, we should refer to the greenhouse effect caused by *human* activities (often called the "anthropogenic" greenhouse effect), since (another potential source of confusion!) there is also a natural greenhouse effect at work, keeping our planet warmer than it would otherwise be.

Cold spells in northern Europe, if nowhere else, certainly have recurred at fairly regular intervals over the past thousand years or so, in the 13th, 15th, 17th and 19th centuries. The most famous of these is the Little Ice Age of the 17th century, when London's Thames river froze hard on several occasions, and tented cities ("Frost Fairs") were set up on the ice. There is also evidence, from old observations and from the amount of radioactive carbon-14 locked up in tree rings, that the Sun was less active at the time of these cold spells.

Whether or not the Sun is to blame, however, the best indication of this climatic rhythm comes from studies of ice cores drilled from the Greenland glacier. Variations in the proportions of the two isotopes oxygen-16 and oxygen-18

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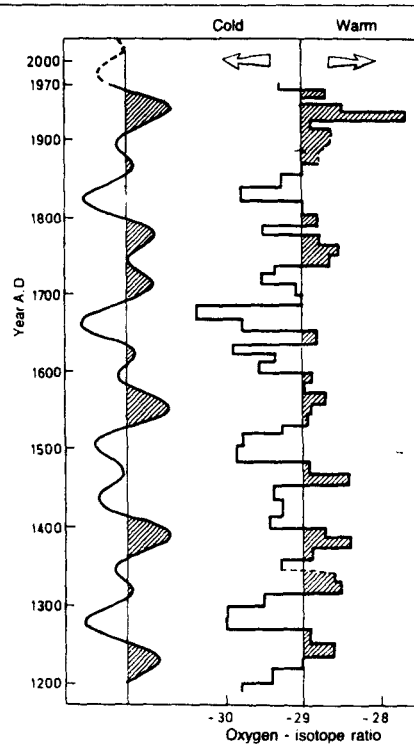
in the water molecules of the ice, at different depths below the surface, are interpreted as a guide to temperatures of the past. These can be calibrated by comparing data from the upper part of the core with historical records. The logic behind this is quite simple —oxygen-18 is heavier than oxygen-16, and so molecules of water containing oxygen-18 evaporate less easily from the oceans. Just how much evaporates (and therefore makes its way into the snow and ice) depends, observations show, on the temperature. The ice-core studies, pioneered by the Dane Willi Dansgaard, in Copenhagen, suggest (with a little imagination) the presence of two repeating rhythms in temperature fluctuations, one about 80 years long and one about 180 years long.

The rhythms are shown, with the raw data on which they are based, in Figure 1. Sure enough, they suggest that the world should have warmed during the



(Based on figures supplied by Willi Dansgaard.)

Figure 1: Oxygen isotope data from Greenland (right). When the variations are smoothed out and analyzed (left), they seem to fit a pattern built up from two smoothly varying temperature cycles, one 180 years long and one 80 years long.

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20th century regardless of the anthropogenic greenhouse effect, and that we should now be in a cold snap. But this is not new work—it was published in the early 1970s, and it was set in the context of the anthropogenic greenhouse effect as long ago as 1975, by Wallace Broecker, of the Lamont-Doherty Geological Observatory, in New York.

Broecker actually took the projection of natural cycles of climate at face value, extending it forward into the 21st century and combining this projection with a forecast of global warming due to the greenhouse effect, based on the simple models available at that time. His conclusion, published in *Science* (vol 189 p 461) in 1975 was that the greenhouse effect would overwhelm the natural cooling trend in the 1980s (Figure 2).

But Broecker's projection was largely ignored for many years. Scarcely more than a decade ago, climatologists still made headline news with claims that a new "Little Ice Age" was due at the end of the 20th century, following those natural rhythms which also brought cold in the second half of the 17th century and early in the 1800s. By the end of the 1980s, however, the focus of attention had shifted to the greenhouse effect, treated in isolation and with no reference to the natural temperature cycles of recent centuries.

As surely any *Analog* reader now knows, the greenhouse effect is a proc-

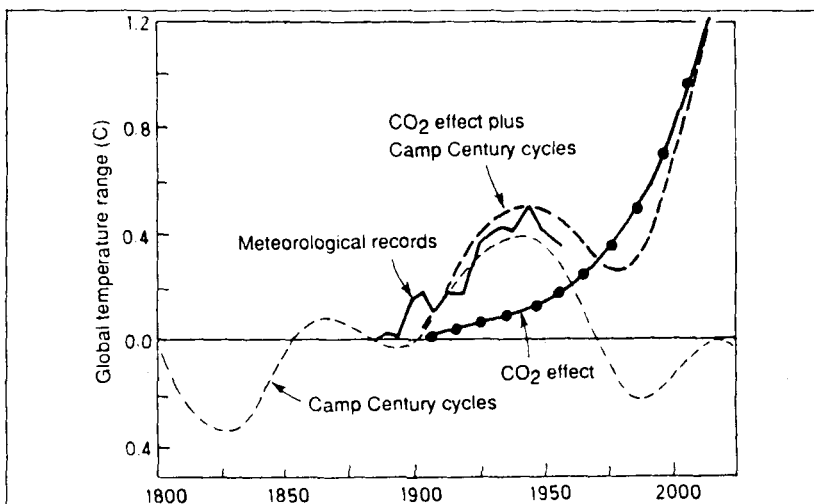

Figure 2: By combining the Greenland cycles with calculations of the carbon dioxide greenhouse effect, Wallace Broecker warned in 1975 that the world was on the brink of a rapid global warming. Temperature variations since 1975 closely match his forecast. (Source: *Science*, volume 189 page 461, 1975)

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ess whereby heat is trapped near the surface of the Earth by gases in the atmosphere. Incoming solar energy is mainly in the visible part of the electromagnetic spectrum, corresponding to radiation from an object (the Sun) with a surface temperature of approximately 6,000° C. This radiation passes through the atmosphere as easily as light passes through the glass in a greenhouse, and warms the surface of the Earth. But the average temperature of the Earth's surface is only 15° C, so it radiates energy out again at longer wavelengths, in the infrared. It happens that infrared radiation is strongly absorbed by naturally occurring gases in the atmosphere, especially carbon dioxide and water vapor. So some of this heat is trapped and re-radiated back to the surface of the planet.

Without this natural greenhouse effect, the average temperature at the surface of the Earth would be roughly the same as the average temperature on the Moon: about −18° C. The natural greenhouse effect warms the Earth by about 33° C, crucially taking the temperature above the freezing point of water, and making our planet a suitable home for life forms like us. But now we are adding to the greenhouse effect. Over the past hundred years, the amount of carbon dioxide in the air has increased by 25% as a result of human activities. In 1990, the latest and most authoritative contribution to the greenhouse debate came from the scientific working group of the Intergovernmental Panel on Climate Change. It talked of temperatures increasing to 1° C above present levels by 2025, and continuing to rise at 0.3° C per decade throughout the 21st century, if no action is taken to curb emissions of greenhouse gases. But the report makes no mention of natural climate cycles, and the recently publicized threat of global cooling.

It is small wonder that some people are confused by all this, and ask whether by the end of the present century expert opinion might not have taken another turnabout, with mini ice ages back on the agenda. But what seems to outsiders like a complete about-face by climatologists actually represents a gradual evolution in our understanding both of natural climate rhythms and the human (anthropogenic) impact on climate. It is now clear that the anthropogenic influences are overwhelming the natural cycles, so that although nature may be trying to cool the Earth in the 1990s, the anthropogenic greenhouse effect will maintain the recent warming trend. In the 21st century, when the natural cycles turn upwards again, they are likely to combine with the greenhouse effect to produce a warming even faster than the IPCC report suggests.

The analysis of the ice core data shows that over at least the past thousand years the northern hemisphere, in particular, has been affected by two roughly cyclic temperature variations, with rhythms 80 and 180 years long. Exactly the same rhythms show up in records of the Sun's activity, revealed in particular by the changing number of dark spots on the surface of our local star. The inference—not yet fully accepted by all scientists—is that changes

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in the heat output of the Sun cause "Little Ice Ages" on Earth at intervals of roughly 180 years. But—*how big a change in solar output is needed to account for the climate changes?* Incredibly, this piece of the puzzle was only slotted into place in 1990.

A great deal of the evidence that solar variability affects our climate was gathered in 1990, in a report just published by the Royal Society in London (*The Earth's Climate and Variability of the Sun over Recent Millennia*, edited by J-C Pecker and S. K. Runcorn). One contribution to that report, from a team at the University of East Anglia, England, investigates the change in solar output required to account for these cool intervals on Earth. The problem the team has solved, with the aid of the latest computer models, is determining how sensitive the Earth's climate is to the "forcing" produced by changes in solar output. The change in solar heating needed to explain the temperature variations of recent centuries turns out to be between 0.22 percent and 0.55 percent. And although, if the cycles persist, a similar cooling is indeed now due, the same team calculates that the influence of the anthropogenic greenhouse effect on the Earth's climate is *already* equivalent to an increase in solar output of 0.9 percent, with more still to come. The next "Little Ice Age" may be happening right now, and we cannot tell because it is being overwhelmed by the anthropogenic greenhouse effect!

It's worth noting that even if the solar theory is wrong, the conclusion is the same. *Whatever* it was that caused the Little Ice Ages of the past millennium involved a forcing of global climate half as big as the change that has already taken place, as a result of human activities, in the 20th century. Human influences on climate are already twice as big as the natural change that was causing concern a decade ago. Nobody appreciated this then, partly because at that time such concern as there was about the greenhouse effect focused solely on the role of carbon dioxide, the main anthropogenic greenhouse gas, produced by burning fossil fuel and by the destruction of forests. During the 1980s, however, it became clear that other gases produced by human activities, including the CFCs (which also damage the ozone layer), methane, and nitrous oxide, together add up to produce a *bigger* contribution to the anthropogenic greenhouse effect than carbon dioxide. Carbon dioxide now represents less than half of the greenhouse problem, and the problem is twice as bad as it seemed in 1980.

But still, you may say, a warming of 1° C, or at a rate of 0.3° C per decade, doesn't sound like anything to cause much alarm. The temperature can change by more than that from day to day. True, but a sustained change of this kind poses quite different problems for natural ecosystems. To put things in perspective, think of the effect on trees of such a change in climate, sustained for decades. Trees cannot walk away from the equator as the climate warms. Forests adapt by extending their range to the north (in the northern hemisphere) and retreating at the southern margin. But

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how fast can they do this? The arboreal speed record is held by spruce forests, which spread northward at a rate of 200 kilometers per century at the end of the latest Ice Age, about 10,000 years ago. Warming at 0.3° C per decade would require forests to move at a rate of 600 kilometers per century, three times faster than any forest has ever managed before. As a rule of thumb, ecologists tell us that natural ecosystems can cope with a sustained change in temperatures of 0.1° C per decade, judging from the way they have coped with past climate changes. Anything more than this, and wildlife is in trouble. The IPCC report suggests that even immediate action to curb the emission of greenhouse gases—including *cuts* in the emission of carbon dioxide, not the stabilization of carbon dioxide emissions at present levels proposed by some politicians—can only reduce the pace of change to about this level.

If we do everything possible to slow the buildup of greenhouse gases, starting now, we may just be able to keep the rate of change at the limit ecosystems have been able to adapt to in the past. If we fail, then the best we can hope for in the 21st century is a managed ecology, a global park, with no real "wildlife" at all.

On the climate cycle hypothesis, the 1980s should have been very cold; in fact, they were very hot. The implication is that when the natural rhythms turn upward again as we move into the 21st century, adding their strength to the growing greenhouse effect, the world will warm much faster than any of the standard models, including the IPCC report, suggest. So it is indeed the threat of global warming, not of a new Little Ice Age, that keeps me awake at nights. ■

ABOUT THE AUTHOR

Dr. John Gribbin has been writing about climate change since the early 1970s. His latest book is *Hothouse Earth* (Grove).

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The trouble with depending on what someone else provides. . . .

Nina Kiriki Hoffman
& Jerry Oltion

FLOOR IN LANDIDA

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Before I turn out my light, I always look up at what I think of as my ceiling and see Betsy's bedroom up there, only four meters away, all her things infused with B-gravity so they stay. I know that to her, my bed and desk seem stuck to her ceiling. Sometimes she leaves a hair brush or a bottle of scent on her desk. I imagine the subatomic particle orientation shifting during the night; I imagine one of her things falling on me while I sleep, wounding or even killing me. I can't sleep much on such nights.

Worse, sometimes I imagine *I* lose *my* orientation and crash into her setting. Then I can't sleep at all. My hands grip my bed frame. I'm afraid to turn out my light, as if sight were somehow my anchor, and when she comes off shift (her evening, my morning), opens our mutual door, and walks calmly across the ceiling, my eyes are bleary and dry.

Though Betsy is an attractive woman, and I'm a normal enough man, I don't like her. I hesitate to even fantasize about her. She's the same bone-ivory color as the walls in our room. Unlike most of the people I spend my time with, her face doesn't bear the reassuring oval sunburn of an outerhull tech. She's one of the scientists. They stay locked in the long-distance lab, using alien technology to manipulate things down on the surface of Earth, trying to find a cure for the Gold. These people, who plunge their arms into long-sleeved gloves, watch monitors, and move their hands to make things move far away—they remind me of voodoo doctors using sympathetic magic. When I work, I'm only a suit's-skin away from my tools and my welding. Betsy never *touches* what she does.

I'm afraid her work will touch her, though. I think the Gold will jump across the vacuum, riding the electron beam, to infect her in her isolated box. I think she will bring the contamination to me, smiling down at me from the ceiling, breathing out infectious agents too small to be trapped in her gravity. They'll drop onto me and enter through my pores and multiply until all the blood in me clots, and my skin turns pale gold.

But Betsy never smiles at me, so perhaps I'm safe. She never even looks at me. That's another thing I don't understand. She never studies me as I study her. How many men has she lived with that she can afford not to look at me?

On the other hand, I've heard of some strange adaptations to Double-up. Maybe hers is to ignore me, perhaps to ignore everything in A-grav.

Some nights I know I haven't slept in far too long, so I take a lights-out. But the last time I did that I spent all night dreaming I was falling and woke to sweat-darkened sheets, smelling my own fear. I thought maybe the ventilation system had broken down again. Betsy would hate that; she can't bear a human being who smells human, and she hides her pale scent under a mask of flowery perfume. She sprays our whole cabin when I'm on shift. It makes me choke to come home to it. I talked to the personnel buffer about it, but he said there's no place I can move to, not until we get Landida built. With the help of Double-up we've gotten all the survivors off Earth, but for air I can't smell,

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I must wait until we build more permanent quarters.

That will take a while. The aliens built these boxes we live in now; we are building Landida ourselves. That's partly out of pride, I suppose, or maybe it's just to give us something purposeful to do. I don't know for sure. Our lives are orchestrated by people we never see. Orders come down from above, and we follow them. All semblance of representative government has died, along with most of the people on Earth. It's the only way to coordinate things, we are told, until a more normal way of life can be reestablished.

I wonder if a normal life is even possible anymore, after watching so many people die. It does something to you, robs a part of your soul. It's been nearly four months now, and I still can't accept it.

Like everyone else I've talked to on the station, I first heard of the Gold when it infected China. Radio and TV stations blared emergency signals and told us to go into the bubble shelters the aliens were building over parts of our cities. TV news reports showed fields of corpses killed by the alien organism; satellite photos, since all the news correspondents there had been killed as well. From our shelters we followed the disease's rapid spread across the Eurasian and African continents, watching whole cities die as fast as the wind touched them.

When I heard we would all be going to live in space, I felt my first glimmer of happiness amid the grief. I had always wanted to go to space, especially after I'd heard that aliens had made contact with us, but for an industrial worker whose daddy had named him after a knife, that had always been an unreachable dream. Now it was a last resort, a move we all made in desperation, but at least I was going. I could even do my same job when I got there.

When I was told I'd be sharing a room with a woman, I was even happier. I wondered why I wasn't bunking with one of my workmates, but I wasn't about to complain. I envisioned a slow courtship as we grew to know one another, culminating in passionate zero-gee lovemaking as we clung together, our opposite gravities canceling.

That has happened to some roommates, but certainly not to us. Besides, the slightest difference in weight means one person's gravity overbalances the other's, and the coupling couple falls —albeit softly—to the heavier person's side of the room. Also, the balance is dynamically unstable: if you position yourselves so your gravities push you into one another, you will soon rotate around and find yourselves pulled apart.

Maybe that's why Betsy doesn't initiate a romance. Maybe she can't bear to lose anything else so suddenly, the way we have all lost Earth.

The aliens say we can never go back. The infection they brought has spread over the entire planet now. Everyone who couldn't make it to a sealed shelter is dead, and anyone who goes back down will die as well. Our immune systems won't recognize the organism as an antigen, so we can't be vaccinated against it.

The aliens have apologized profusely. To make up for their carelessness, they have given us access to some of their technology: matter transmitters,

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gravity generators and polarizers, starship drives, vacuum construction techniques, whatever Betsy uses in her work; and they've trained us in the skills we need to use these things. They've also given us the bad news that most of the real estate in the galaxy is already in use, so we find ourselves little inclined to build an ark and seek out a new world.

Instead, we are building Landida Station. We will all have floor in Landida. Ha.

When it's time for my shift, I leave the room with a last glance at Betsy. I walk down the arrow-straight corridor to the dressing room (dodging the returning B-shifters on the ceiling), go into the coffin and do the reverse-polarity water on, water off thing they call a shower, then suit up, triple checking all my seals, systems, and supplies. I love the mass of my boots, their heavy shuffle-foot soles thick with magnets. No A-grav or B-grav on Landida. When I'm outside in my suit, *I* get to choose which way is down. Sometimes I wish they would just let me live outside, but the suit is too valuable a resource. I share it with two others. That's why the shower before every shift.

On my way out the door I notice a message written in orange crayon beside the latch:

Space above, Earth below
My feet are in the sky, you know
Over, under, sideways, down
Every smile we see's a frown.

The Poet has struck again.

Nobody knows who the Poet is. Poet messages appear everywhere: floor, ceiling, walls; gravity makes no difference. Nobody takes credit for them. Rumors abound about a person who hasn't passed through either A-grav or B-grav transmitters, and thus is slave to neither effect. The Poet supposedly has access to every place in the station—it's all free-fall to the Poet.

Sometimes I've seen the same message twice, two different handwritings. Maybe the Poet is more than one person. I'm not particularly interested in the Poet's identity, but I smile at the poems. They make people think.

I wonder whether the people in control of the station smile when they see them. I wonder if the people in control are even people. Maybe they don't even understand poetry. Maybe that's why the Poet uses verse. I leave the dressing room with my mind full of questions; no doubt just what the Poet intended.

At the lock I join the rest of my crew. We're on solar panel detail today. I listen to our leader's instructions, then gather my equipment and leap off into the void toward Landida. I once jumped from a bridge with bungee cords tied to my waist; that was scarier, but jumping into space is always a thrill.

With the sun behind us, Landida gleams like a stack of freshly-polished chrome wheels. Hundreds of individual living units will spin separately within the larger cage; small towns joined loosely into one large city. Wings sprouting all along the framework are the solar panels. We've got about half of them installed.

I'm thinking about today's job when Bavol, my partner, uses our private comm channel to say, "Hey, Shiv, have you heard the latest?"

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"I don't know," I reply, looking over at him, and beyond him to the Earth beside us. The terminator is about halfway across the globe. Storm systems swim out of shadow into sunlight. They're still white as ever, but I know they're full of Gold.

Bavol and the rest of the crew are half-lit figures against the tainted clouds. Impotent supermen, without capes, flying to work. "I don't know," I repeat. "What's the latest?"

"The aliens have asked permission to start a colony."

"On Earth?"

"Where else, dummy?"

"But I thought—the Gold—"

"The Gold doesn't hurt them at all. It's a symbiotic microbe to them."

I remember a phrase I saw written on the communal shower room floor once: "Gold is Cold." I thought it meant uncaring.

"What do you think?" I ask. "Should we let them?"

"Do we have a choice?"

I know what he means. They've given us so much, so freely, but how do we know what they might be withholding from us? Certainly they haven't given us the power to resist them, not after what they did to us. It's axiomatic: they're stronger than we are. They can take what they want.

A chilling thought strikes me. Maybe they already have.

I find it hard to concentrate on work the rest of my shift. I keep looking over my shoulder at the off-limits Earth, and wondering.

I skip my usual hour of video after work. I'm not in the mood to watch dramas set in a world that will never exist again. I'm not in the mood for anything but staring at walls and thinking black thoughts.

Betsy is just getting up when I arrive. I avert my eyes while she dons her robe and goes into the fresher, then I pick up my chipbook and lie on my stomach on the bed, pretending to read, my back to her existence. I realize she has been paying at least a little attention to me: she knows my schedule. She expected me to be gone another hour or two. Normally she would be up and out to breakfast by the time I arrive.

When she comes out, dressed in light blue, I glance up and say, "Good morning."

"Good morning," she replies, a little startled, I think. Her voice is high. She wears her long yellow hair loose, and it bothers me that it never floats down toward me. Silly, but one of those details that gets more important because you try to ignore it.

Like the detail that's been bothering me all day.

I roll over and look up at her. "You work on Earth, don't you?" I ask.

She looks directly at me for the first time. Her eyes are the dark blue of the funnels in storm centers over ocean.

"What?" she asks.

"Your work. You do telepresence on Earth."

"Yes."

"What kind of things do you do?"

Her forehead wrinkles as she narrows her eyes. "I'm a lab tech. I do biological testing on the Gold. It's mostly button-pushing. Why?"

I set my book down and sit up on the bed. She remains standing beside hers;

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if I reach hard, I could touch her head. "Do you ever wonder whether you're dealing with the real thing?" I ask.

"The real thing?" Her hand creeps toward the scent bottle on her desk. I think she sprays it without knowing, for security.

"If your lab really exists. It could be virtual reality. You'd never know the difference."

She frowns, and I realize that an upside-down frown looks nothing like a smile. "Of course it exists," she says, turning away, dismissing me while she brushes out her hair. She lays her brush beside her upside-down scent bottle on her upside-down desk, then opens the door and steps out. But she is thinking about it, I know.

I spend the rest of my waking period trying not to. Suppose the aliens *are* hiding something from us down on the surface of our own planet. What can we do about it even if it's true? What can we do about anything?

On my next work shift I'm concentrating on my welding, watching out for laser reflections and loose hot-balls, when I sense someone close behind me. I shut off my light torch and turn, raising my visor, to see Bavol standing there, a hand before his faceplate, index finger extended over where his lips would be if I could see through his glare filter. He leans down and touches his helmet to mine, but doesn't speak.

Whatever he has to say is something he doesn't trust even over our private work channel. I click off my radio and say, "OK, we're silent."

"I've figured out how he does it," he says, his voice distorted by traveling through our helmets.

"How who does what?"

"The Poet."

"What about the Poet?"

"He eats B-food. Or if he's a B-person he eats A-food. He gradually gets lighter as the other kind of molecules get incorporated into his system. Eventually he's in free-fall."

A ludicrous image comes to mind. "I think it would be hard to keep your food down. Or up. Whatever. In."

"You're disgusting," Bavol says, but there's laughter in his tone. "And you're wrong, too. It's kind of hard to coordinate at first, but once you figure out how to swallow, it works just fine."

"You've tried it?"

"Yeah. Janet and I did it last night."

Janet is his roommate. He speaks of her often. I try to imagine Betsy and me sharing such a meal. I imagine us feeding one another, laughing as we spill things and they fall in opposite directions. I imagine her holding her bread butter-side-down, and me licking the butter from her fingers. I grow warm within my work suit.

"We're going to eat each other's food until we're free," Bavol says. He backs away, our connections broken. I click on my radio and hear him saying, for the benefit of anyone wondering what our huddle was about, "Yeah, that ought to do it. Glad you caught that, Shiv."

"Just doing my job, Bavol," I say, wondering what that job might be now. Should I suggest to Betsy that we share our meals? Then what? Write poems on the walls? There has to be something more we can do.

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* * *

She's already awake when I arrive home. She sits on her bed, waiting nervously for me. The air is thick with scent, a cloying mix of lilac, strawberry, and other more exotic aromas. Her blue eyes meet mine the moment I step through the door, and startled, I say, "What?"

She stands, still looking at me. She holds out a hand, palm up, bearing a finger-thick disk of electronic components. It looks cobbled together, with sloppy solder in spots, two mismatched buttons, and two LEDs: one red, one green.

I take it from her outstretched hand, feel it pulling upward. This is the first time I've handled a B-grav object; it feels almost alive, like a captured sparrow struggling to fly free.

Betsy pushes one of the buttons, and the green light begins to blink. "Sweep it around," she whispers, waving her arms slowly around our small room. I copy her movement, and when I near my bed, the green light stops blinking and the red one starts. I walk closer, and the red one blinks faster. I follow the blinking light and it leads me not to the bed, however, but to a spot on the wall beside it.

I look up at Betsy. "Something in the wall?" I ask.

She shakes her head and points to a scratched-up spot on the wall beside her bed. It looks as if she's scraped it with a wire brush or something.

"The *paint?*" I ask, and she nods.

I look for something to scratch with, and decide on my watchband. It gouges off flakes of paint, and a layer of something else beneath it. When I hold Betsy's detector next to the wall again it blinks green.

"Was that a bug?" I ask, handing the detector back to her. "Why would someone bug us? We never talk."

"We did yesterday," she says, sitting down on her bed again. She reaches out to a scent bottle on her desk, squeezes the bulb.

"The bug was here before that," I point out.

"So maybe they bug everybody."

"Who's 'they?' "

"The aliens. Some of us working for the aliens, maybe. Same thing."

"You sound awfully sure."

She nods, her expression solemn. "I tried something at work yesterday. I deliberately mislabeled a tube of the Gold as an inert control and exposed some human tissue cells to it. The culture's still alive."

"What?"

She nods. "The Gold didn't kill it. Or should I say the program didn't kill it? It thought I was exposing the cells to normal air, so it didn't do anything."

I sit down, too. I feel light, as if I'd just feasted all day on Betsy's food. Tilting my head back so I can see her, I say, "You're sure the tube really had the Gold in it?"

She shakes her head angrily. "I'm not sure there even *was* a tube, or a culture, either. I think you were right; the whole lab is probably a simulation."

"Hmm," I say, buying time to think. I have only been speaking paranoid thoughts aloud: I have no plan for action now that those thoughts have proven true. I try to look at the situation logically. "Even if it *is* a simulation, that

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doesn't necessarily mean the Gold isn't a real danger."

"That's true," she says, "but if one aspect of it is fake, why not all of it? I mean, did you ever actually see anybody die of the Gold?"

"Of course not. If I'd been close enough to see it, it would have gotten me, too."

"So they said. What if *nobody* died from it?"

Nobody dead? The idea seems almost obscene, after grieving for so many billions of lives lost in the epidemic. "Where'd they all go?" I ask. "There aren't five billion people on this station."

"Maybe there are lots of stations."

Maybe there are. Space is vast; there could be thousands of them—millions, even—the people on each thinking theirs is the only one. Keeping them from finding out about each other would be tough, but not impossible. For the aliens, it might not even be tough. But—"Why would they do that? Why go to all that trouble just to get us off Earth? If they wanted the planet for their own, wouldn't it have been simpler to really kill us all?"

She shrugs. "Maybe they can't. The Universe is already populated, or so they say. If *that's* true, then maybe they've got laws against killing off indigenous populations."

I nod. "And loopholes in the laws. Like they can't steal the planet outright, but they can scare us off and then ask our permission to live there."

"They *have* asked," Betsy says.

"I know."

"Somebody's bound to say yes."

"Not if we expose the aliens first."

Betsy's eyes are wide. Her hand has stopped in mid-reach for the scent bottle. "You know what that means, don't you?" she asks. "If we say the Gold doesn't exist, then we've got to prove it."

"If it *doesn't* exist, that would be as easy as going back to Earth."

"And if it does exist after all?"

"Then we die." I'm not as calm as I sound, but I can see no middle ground.

"They would stop us," she says.

"Not if we go before they suspect something."

"They already suspect something. Their bugs suddenly went silent."

"Two bugs among millions. Maybe billions. They might not even know about it yet."

"They will."

She's right. We might as well have rung an alarm. "Then we should go now, before anything comes to stop us." My own words make me shiver, but I stand and step toward the door.

Betsy doesn't rise. "What good will it do to go to Earth if nobody knows we did it?"

She has a good point. "We'll have to tell someone," I say.

"How? There's no newspaper. There's no new TV. The only way we find out things is when people talk about them."

"Or when we see it written on the wall."

She stares at me, silent for a moment, then says, "You're the Poet?"

I laugh. "I don't even own a pencil."

She stands, reaches into her desk. "I do."

We're between shifts, so there isn't much traffic in the corridors. We trade

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Betsy's pencil back and forth, stopping in all the communal areas we come to: the mess, the bathrooms, the library, the gym. We leave messages.

Is Gold on the Earth?
Is Gold in the air?
Or did the mind give birth
To this life we share?

Fool's Gold glitters, doesn't kill,
Unless we let it break our will.

If aliens want our land of old,
Shouldn't we be sure *there's Gold?*

We work our way toward the banks of matter transmitters in their compartments near the airlocks. The transmitters are smooth, simple-looking things, more like airport security stations than transportation devices. Their simplicity makes me believe that the aliens have been using them for a long time. I wonder if they're booby-trapped, if they'll refuse to send us back to Earth, or if they'll scramble our brains on the way. The presence of guards make me think not, since normally they would prevent any unauthorized person from using the transmitters.

But the guards are human, not alien, and after they listen to our story one of them says, "It's either an elaborate suicide pact, or else you're telling the truth. Either way you won't bring back the Gold. I say we let you go."

The others, including the technicians who run the transmitters, are more reluctant, but Betsy says, "We may not get another chance. We've been writing poems all over the walls about it, and we destroyed two bugs in our room. For that matter, we're probably being bugged right now."

"If you're right about the Gold, then we'll need to do more than write poems on the walls," another guard says.

"That's where you come in," Betsy says. "The poems are to make people think in case we can't get word back to anyone, but if we can, then you should start spreading the word that it's true. And start sending more people down."

The guard who first agreed with us takes something off a shelf behind her and hands it to me. I see that it's a portable backpack radio. "Now you can get word back to us," she says.

Her action is the catalyst that decides the others. Betsy and I find ourselves standing between the transport panels, eyeing one another upside down while a technician sets the coordinates for our destination. Betsy smiles and whispers something I can't hear to the technician when he asks where that should be, then she looks up at me, her expression inscrutable.

I am about to wave goodbye when the room flickers and bright sunlight floods over me. I blink and sneeze. So much for holding my breath for one last moment of life. The air smells like the air in our room. When I open my eyes I see Betsy, right-side-up for the first time since I've known her, standing in a riot of flowers. We're in a park somewhere, in a rose garden. It figures.

I take a deep breath of the flower-scented air and wait for the Gold to kill me. When it doesn't, I unclip the microphone, hesitate for a moment, composing, then say:

"We've made it to the rainbow's end
But there is no Gold here, my friend."

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* * *

I see my first real Betsy smile then, and it's beautiful. The world is beautiful. I think of what the aliens have given us, and I laugh aloud. We have all we need to go out into the galaxy ourselves now, and make a few land deals of our own if we want. We're not exactly new to that sort of business. And now that we've got matter transmitters, cars are obsolete. Maybe we can sell a bridge or two. ■

IN TIMES TO COME

● Solving just about any problem involves applying some sort of force to some sort of object. Half the difficulty—the obvious half—lies in making sure you have the strength to apply the necessary force. The half that's easy to forget is that the thing you're applying the force to must have the strength to stand it. If it doesn't, then you have to resort to something beyond mere force, like cleverness or subtlety. Consider, for example, the dilemma of the astronauts in Robert R. Chase's Mid-December cover novelette, "Try a Light Touch"—which incidentally offers a few points to ponder about some traps our current culture may be weaving for itself. It comes with a delightfully misleading cover by Kelly Freas, though when it's all over I think you'll agree that it wasn't *really* misleading. . . .

The fact article is a family affair, in which physician Ronald V. Dorn and physicist Geoffrey A. Dorn bring their complementary specialties to bear on the subject of protecting humans from ionizing radiation in space. The rest of the fiction line-up is a diverse assemblage including the conclusion of Laura J. Mixon's *Glass Houses,* as well as stories by Stephen L. Burns, Jerry Oltion, and a couple of promising newcomers.

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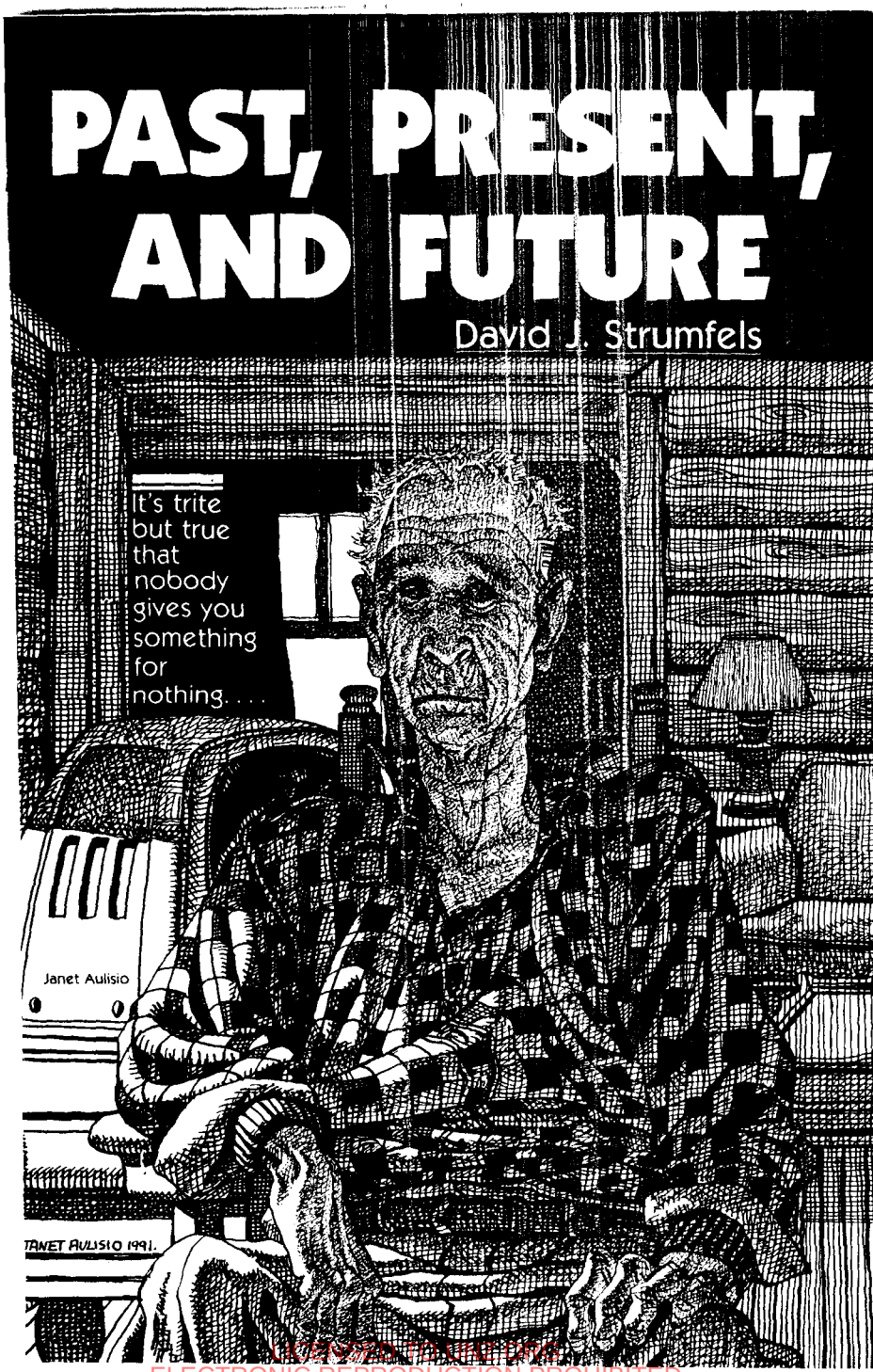
PAST, PRESENT, AND FUTURE

David J. Strumfels



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"This operation, doc, it ain't gonna hurt, is it?"

Doc O'Malley gave one of her famous "Everything will be just fine" smiles that everyone who used her clinic floated away from the examination room with. Pete Abelson remembered when that smile was delivered out of a smooth, freckled face, a face just out of—just out of wherever it was doctors come out of when they were getting started; a face that had come with wide, green eyes, as though the Lord himself had wanted to emphasize the point. That was back when she had just come up here and started the clinic. Thirty, maybe forty years ago, if Pete remembered right. Only yesterday. Now the face was wrinkled almost as much as his own, and the eyes, though still green, had been pinched by crow's-feet for many years. Her once copper hair, which used to flow down to her shoulders, was pulled back behind her head in a tight gray bun. Comes from workin' too many eighteen-hour days, Pete thought to himself; should'a cut down to twelve or fourteen, if she wanted to stay young and pretty. If she'd wanted to get a husband.

"I promise, you won't feel a thing, Pete." The smile, she still had that. "Those city hospitals are very good about things like that."

"Ya mean, they gonna knock me out?" He felt guilty at once at the question, for he hadn't meant anything about her doctoring. "Not that there's nothin' wrong with a little pain, mind you; I always said it's good for the soul." Besides, it wasn't her fault she never could afford all those expensive city medicines. But he couldn't shake the pang of guilt.

She was shaking her head. "I'm sure they'll use a local anesthetic. But don't worry; they'll have a general standing by just in case. But I guarantee you that they won't need it. The brain can't feel any pain, didn't you know that?"

That didn't sound right to Pete. Wasn't your brain where you felt everything? But if Doc O'Malley said it, it had to be true; he'd learned that a long time ago. "No: can't say I ever heard that." He nodded slowly at the revelation. "Learn somethin' new every day."

Doc O'Malley smiled again. Half an hour later she had finished her examination, and pronounced him as fit as an eighty-two-year-old man had any right to expect. Not that she had to tell him that; a feller who could walk a mile to the well every morning, no matter how cold it was, and chop his own firewood didn't have a lot to worry about, not as far as he could see anyway. He'd be a darn fool to have this operation if he wasn't in as good a condition as he was. "Of course," she cautioned him anyway, "They'll want to put you through a lot of tests at the hospital too, just to make sure. But I'm sure you'll fly through those; you're healthier than most of those city types half your age."

That was what she was saying anyhow. But her eyes; they were looking at him kind of funny, like they were one of those X-ray or NMR machines he'd seen when they thought he had that cancer, must have been twenty years ago now. Like she was trying to find another way of seeing him, because her old way hadn't told her what she wanted to know. "So what'sa matter?" he finally

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challenged her. "C'mon doc, I ain't stupid, ya know; tell me what's on yer mind. What's wrong?"

"Hmmm?" It was as though he'd snapped her out of a daydream. "Oh, nothing. Nothing at all. I mean, I was just wondering—ah, well, you know—" He thought she was never going to stop stammering around like that, but finally she got to the point, "I mean, you are eighty-two years old after all." She looked pained, struggling for the words to say whatever she was trying to say. "Why—" she shrugged at her failure, "I mean—" She held her hands out at him, as though she were fending off an attack. "Don't get me wrong. I think getting your diploma is a wonderful thing, but—"

"Doc, I ain't ever seen you so tied for words," he said. "Just spit it out, fer cryin' out loud. Gettin' m'schoolin' is a wonderful thing, but what?"

But she was grinning and shaking her head. "But nothing. It's a great thing, that's all. I'm just getting foolish in my old age is all. Sorry."

He nodded soberly. "Yeah. Well, havin' an implant is terrific I suppose, but it don't stop foolishness. That's up to the feller."

She laughed and offered him her hand. "Good luck, Pete."

The hour's walk home seemed to take hardly ten minutes; Pete was stepping up on his front porch almost before he realized he'd chewed up the miles of dusty roads. As usual, the boards of the porch floor groaned beneath his feet, reminding him of their ancient need for repair. As always, he nodded at the gentle nudging, promising to get around to it before another summer was gone, then muttered to himself when the door clattered shut behind him and he figured he was out of earshot. Putting a kettle on the stove, he sat at the kitchen table and caught his breath while it worked up to steam. Always it was something that needed fixing; last year it had been the new roof, year before that the window sashes, year before that when that lightning bolt had tossed the old oak—the only thing on his land that had been older than him, save the land itself—against the chimney and took off about half of it. Year before that was something else, but he couldn't remember what anymore; it was as though the oak had dropped a wall between him and the more distant past.

He remembered when he didn't mind all the constant fixing, when he even looked forward to the chance to use up strength that would otherwise have been tearing up inside him. Of course, that was when he could haul hundred-pound logs all day like it was nothing.

He had built the house with his own hands, so long ago that he sometimes looked at the gnarled bones and wondered if they were still his hands anymore. Back after The War, he remembered that for sure. Must've been forty-seven, forty-eight. Took him what seemed like years, working evenings and weekends, whenever pa could spare him from the farm and the lumberyard. When it was done he brought Molly here, raised two daughters while losing two—that was before Doc O'Malley—and watched as the world around him grew more distant every day, more mysterious and incomprehensible. Things like bombs that could blast

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whole cities, and rockets that could send them halfway around the world in a catnap, and machines that could think, and men walking on the Moon, and no doubt more that he'd never gotten around to hearing about because he never had the time or the talkin' to hear. But the details were lost now, encased in a fog of thick time, behind the curtain of time the oak had brought down. Even Molly was gone now. All he could remember now were the feelings, mostly the helpless awe of understanding that history was being made and he wasn't part of the making.

Which was something he'd always taken for granted.

Absently, he pulled out the letter again, placed it on the kitchen table alongside the filled medical forms which he'd carried home with him in his back pocket. Twisting his bifocals around his ears, he picked up the single sheet of fax paper and read it again.

Dear Social Security Recipient:

According to records maintained by the Social Security Administration, you are not in legal possession of a degree or certificate of graduation or other such documents which indicate completion of an approved course of study at an accredited public or private high school or equivalent. It is the purpose of this correspondence to inform you that under Article II, Section 24 of the Literacy and Educational Improvement Act of 1997 you are, being of age sixty-five or older, entitled to full compensation from the Social Security Administration for expenses incurred in the pursuit of such degrees or certificates. In addition, you are entitled to 80 percent compensation for expenses incurred in the pursuit of advanced degrees, up to and including the level of Doctor of Philosophy.

Please do not hesitate to contact this office for any information you may require in applying for this compensation, or concerning your rights, qualification, and obligations under the LIA.

Very Truly Yours,

ARTHUR A. BREWINGTON

Administrator

Even Chester hadn't been able to figure out what the heck it was trying to tell him. "Government talks stranger all the time," was all he'd been able to offer after a half dozen tries. "Why don't you take it to Doc O'Malley? She deals with that kind of talkin' all the time. Me, I just deliver the mail; I'm not s'pposed to read it, you know." He'd delivered that last statement with a practiced shrug, just as he'd been doing for as long as Pete could recollect.

"Yeah, I 'spect that's the thing ta do," Pete had agreed.

He had sat in the waiting room for over an hour, leafing through the old magazines which he was sure had never changed since the first time he'd come here. He didn't recognize the two other people besides him; they had looked away when he'd entered, and pretended not to notice him the entire time. A young woman and a child. New around here, no doubt about that. He assumed the child was hers, although he couldn't tell for sure; they pretty much ignored each other, too. The woman looked impatient enough. When O'Malley finally poked her head in to ask for the next patient, the woman seized the child's hand and announced her rights in a chal-

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lenging voice. O'Malley smiled at Pete before vanishing with the twosome.

It seemed only a few minutes later when he was summoned back. He did not see the woman and child. He took a seat in the examination room and waited for O'Malley to finish whatever she was doing in her office. Finally, she bustled in and sat before him, folding her hands on her lap in a distinctively uncomfortable manner, as though something were missing from them. She looked worried. "What can I do for you Pete? I haven't seen you around here for quite a spell. Hope everything is all right?"

"Oh, 'bout as well as can be 'spected." He fished the fax out of his pocket and unfolded it neatly. He started to say something, then handed it to her and waited while she scanned it. The glint of her contacts reminded Pete why she didn't need glasses for reading.

She looked at him funny when she had finished, like she was all worked up inside about something. She almost bit her lip, something Pete had never seen her do. "Wow. Are you going to do it?"

He accepted the paper back, and returned it to its sanctuary. "Am I gonna do what, doc? I was hopin' you could tell me what it was sayin'."

She laughed, not at *him* of course, and translated the letter. That was when she told him about the implants. It took several tries before Pete grasped just what she was telling him. "You have to understand Pete," she concluded, "Education has changed a lot since you—both of us for that matter—were in school."

"I figgered that," he'd said. "But I never figgered they'd start stickin' things in yer head an' stuff. That don't seem—well, natural. Why can't I just get schooling the old-fashioned way? Used ta be good enough."

Her smile was weak this time. "Not anymore, I'm afraid. Nowadays there's just too much you have to know. Nobody can remember all of it and hope to keep even a fraction in their head. But that's not the main reason. When we were kids so much school time was devoted to memorizing facts that few people ever learned how to think or be creative. That's not very efficient, if you think about it." She shook here head. "I remember a social studies teacher back in high school making me memorize all ten sentences of the Gettysburg Address. Now, if I need something like that, all I have to do is pop in the right module, and it's there. If I had been able to do that back in school, that time memorizing it could have been spent reflecting on what the words mean. And if every school child in the last, say, hundred years had been able to do that, just imagine how much better a world we would have today."

Pete tried to imagine, frankly, he wasn't exactly sure what it was he was supposed to be doing. "Four score'n' seven years ago, our forefathers. . . ." he started reciting; but he couldn't go any further than that.

"Fathers," O'Malley corrected him.

"What's a score anyway?" he asked grateful at having finally thought of the question in the presence of someone who could answer it.

"Figure it out for yourself. The Declaration of Independence was signed in 1776. The Gettysburg Address was de-

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livered in 1863. That's eighty-seven years. Subtract seven and divide by four. Twenty years."

Pete struggled with the arithmetic in his head, finally deciding he would have to do it on paper. But that wasn't the point. He could have thought of that way of figuring it out himself. In fact, it seemed pretty obvious now that he knew it. "I 'spect I'm not smart enough for schoolin'," he decided. "Mebbe that's why I only got up to five or six grade, don't quite remember anymore."

"You don't understand, Pete," O'Malley castigated him. "Nowadays, they *teach* you how to be smart."

He was still confused. "Them implants do that?"

He thought she sighed, but the action was caught so quickly that even a moment later he was no longer sure. "No no," she said. "The implant doesn't do anything to you. All it does is give you access to all the world's knowledge —er, that is, all the knowledge on its public databases. Think of it as adding off-line storage capacity to your brain, freeing your brain to do more processing. But you have to learn, or relearn, how to use your facilities. . . ."

At the time, he hadn't understood a word she was saying. But he could tell, from the way she said them, that whatever the implants were or did or however they worked, they weren't something to be afraid of. Especially once she told him (and was surprised that he hadn't already known) that she'd had one herself for almost five years now. ("One of the older models; I guess I'll have to have it replaced in another year or two.") Course, that didn't exactly mean they were something to be desired either. Pete knew he would have to think about that. So he accepted the papers Doc O'Malley offered, promising himself that he would read them over real careful, and not decide anything until he was sure he'd understood every word of it. The fact that it was being offered for free only made him suspicious, of course; nothing was for free after all, least of all anything that the government was offering. He'd learned that back in The War. But the fact that he would have to pay a price, even one that he couldn't know in advance, did not mean the compensation wouldn't be worthwhile. It was simply a risk, another of several, that he would have to weigh in to his decision.

A million needles were boring into his brain from all angles, slicing through skin and bone and gray matter with ice-cold razor edges. The needles reached deeper and deeper, through layers of dreams he had not even been aware of until they were cut into and screamed out their agonies like bone exposed by slivered glass. Reaching down directly into his soul. He struggled to thrash out, but nothing happened. The leering faces above him held him with black rubber gloved hands, hands that were at once gentle yet irresistible in their grip on him. The faces were concerned. "You're not taking this in the right spirit Mr. Abelson," they, or at least one of them, said. "Don't you want to join the twenty-first century?"

He knew what his answer was, but rough hands were shaking him, stirring the words in his mouth like rocks before an avalanche. The faces and the needles

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congealed into a thick haze, then evaporated. He became aware of a somber darkness, then a clarity of sensations around him. A bed. Morning light streaming in through a window. Strange odors in his nostrils. The hands were still shaking him.

He groaned and opened his eyes. A slender, white-smocked woman stood over his crumpled body. "Mr. Abelson? Mr. Abelson, wake up. You have to get up, sir. Can't have you laying around in bed all day, wasting the doctors' time!"

He sat up. No, he tried to sit up; it was several moments before he realized that his body hadn't responded to the commands from his mind. Then he was sitting up, the slender figure turned out to have the strength of King Kong. He thought she was going to rip his arms out of their sockets. "Lemme sleep," he pleaded with the figure, but she would have none of that: "Sooner you're up on your feet, the sooner you'll be going home," she insisted, gently yet obstinately. "And don't call me Molly; my name is Charlene." A quick smile flitted across her face when she said that.

He let Molly, or Charlene, or whoever she was—she was no Doc O'Malley, that was for sure—lift him to a standing position, and leaned on her freely as she dragged him around the tiny hospital room. Blood stirred, and pieces of the last twenty-four hours started sifting together again as sleep burned away. He reached up, probing, and found the metallic patch on his scalp where they'd inserted the probe. The skin around the patch was sore and hot. "They really done it," he said, in a disbelieving whisper he'd only meant himself to hear. But the moment the words were out of his mouth Charlene pulled his hand away from the patch with a disgusted sniff. "If you play with it," she warned him as though she were speaking to a child, "it'll get infected, and then we'll have a big problem on our hands, won't we? Now—do you need some help in the lavatory?"

Like hell I do, he thought to himself. He shook his head.

"OK, well there's a buzzer in there just in case you change your mind. You press it, and I'll come running. Understand?"

When she was gone he sat down again and searched his head for any signs of anything different. Nothing felt different. He tried reciting the Gettysburg Address silently, but nothing would come, except that he remembered it was fathers, not forefathers. Then he remembered Doc O'Malley talking about modules or something like that, something you had to 'pop in' before the implant could do any good. So where did you get these modules? He sure didn't have any. Maybe you got them—

"And how are you this morning, Mr. Abelson?"

He hadn't realized that someone had entered the room. A slightly vacuous, middle-aged face, with a leering grin, stood before him, holding one of those hand-helds that he'd seen Doc O'Malley using from time to time. Seemed like everyone around here had them. Pete recognized the fellow as one of the surgeons, Dr.—uh—Barclay, if he remembered right. Or one of them had been a Dr. Barclay. He decided this was

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Barclay.

He shrugged. "Bit roughr'n usual gettin' up. I 'spect that'll pass though." He suddenly realized why Barclay was looking at him just contemptuously enough to register while not giving Pete cause to take open offense. "Guess I gave you fellers a rough time yesterday. I sure didn't mean to get crazy like that, I can tell ya."

"That's one of the reasons we keep general anesthesia around," was all Barclay said about it. He punched the hand-held several times, then sat on the foot of the bed. "I realize you're anxious to try out your implant right away, but the incision will take several weeks to heal fully; until then, you can expect some irritation whenever you pop a module in. Once it heals, though, there shouldn't be any discomfort. If there is, contact me right away. I also want to see you if you have any flulike symptoms, or a fever, or any unusual stiffness in your joints or neck. You shouldn't have any problems though, not if you take the antibiotics I'm going to prescribe regularly. But if there are, don't ignore them. Do you understand, Mr. Abelson?"

If anyone else asks me if I understand like that, Pete decided. . . .

Barclay patted him on the shoulder. "I admire you, Mr. Abelson. Not too many your age have the courage to do this, you know." Then he punched his hand-held some more and was gone. Pete rubbed the shoulder, trying to find where Barclay had touched him, but failing.

He wondered if he had done the right thing after all.

"You understand, Mr. Abelson, we don't normally get students of your seniority. Not that we aren't overjoyed at seeing the more mature segment of the population taking advantage of what is, after all, one of the most fundamental rights of every human being, that is, an education. But we may not be, uh, immediately equipped to deal with your special needs. You do understand, don't you?"

In the past few days, Pete had gotten pretty good at this sort of thing. "Yer tryin' ta tell me that I'm old, and you ain't sure how to deal with old folks like me, right?"

Ms. Glaser looked like she'd just found her mouth was full of tar. He'd noticed they all looked like that whenever you translated their words for them. Almost like you were using bad language. "You're not that—advanced, Mr. Abelson," she protested. "Besides, age discrimination went out a long time ago. I just want you to know that we know you are, shall we say, enhanced in facilities we are unaccustomed to servicing." Talking like that seemed to loosen her up, and she even started to smile a little. She wasn't too bad looking when she smiled. "And that we are prepared to meet the needs those facilities create."

"Just tell me where the school is an' when class starts 'n I'll be there," he said enthusiastically.

It was several seconds before he realized that what Ms. Glaser had done was stifle a bout of laughter. The effort had sent a ripple across her thick, middle-aged body, a wave of hilarity which rose through her neck and made her cherubic face swell up momentarily, like a

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pink balloon about to burst. She was composed again almost instantaneously however, and even looked a little embarrassed at her near outburst. "I'm—afraid we don't have schools and classrooms any more, Mr. Abelson. Nowadays, all education services are offered directly through the public nets. You know, through computers?"

I know what the darn nets are, he wanted to bark. But a sickly, almost frightened, feeling had just burrowed into him. "Ya mean, I got to have a computer ta get my schoolin'?"

"I'm afraid so Mr. Abelson," she confirmed his fear. Then she realized what he was telling her. "You're not saying that you don't have one, are you?" She took a deep breath, then pulled a hand-held from her desk and started making entries. "Didn't you know you were entitled to whatever facilities you required for full net services when you turned sixty-five?" She stared at him incredulously.

Pete shook his head. "Ain't nobody told me."

"Well you are, you know."

She said it as though it was somehow his fault for not knowing. Pete knew what he wanted to say, that he'd never asked anyone for anything in his life, that where he came from folks didn't help themselves until they were asked. But there was another question on his mind, something else he didn't understand. "Don't I got to have a phone to get on the nets?"

Glaser gave him another disbelieving stare, this time with a full two or three seconds of an expression Pete had never seen before, like she was looking at a space alien for cryin' out loud, then made more furious entries. "Is there anything else you'll be needing, Mr. Abelson?" she said when she was finished.

He was tempted to ask her how he was supposed to ask a computer to be excused whenever he wanted to go to the outhouse. "What about them modules I keep hearin' 'bout? Ain't I gonna need some a them?"

More entries. This time when she was done, she looked a little relaxed, almost jovial even. "I think you're going to be a real challenge, Mr. Abelson," she promised him, or maybe it was a warning. "But don't worry, we're going to pull you through all right!"

He tried to smile back at her, but his jowls held back, and not just from age. "Right." He felt his molars grind together.

He ran his hands over the smooth surface of the dish, and tried to feel the signals streaming in from outer space, bouncing off the silver skin toward the antenna. Somewhere above his head, about twenty thousand miles above it in fact if that contractor had known what he was talking about, a bristling cylinder of metal and electronics was floating in the sky, beaming invisible signals across almost half the world. Bringing the world to him. It made Pete dizzy, thinking about it.

He looked back toward the house, his eyes following the furrow in the earth where the optical fibers had been laid. The furrow lay on the same path the oak had when it crashed into the chimney, three years ago. There was something ominous about that which he didn't like. Oh, he knew why they had built the dish

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in the same spot the oak had stood for what must have been centuries, that it was the clearest spot on his land, but that didn't make it feel any less sacrilegious. Or whatever he was feeling. Like he was desecrating a burial ground. It stung him with a guilt he couldn't find the roots of, however deep he dug.

Uncertain what to make of it all, he went back inside, ignoring the protests of the porch floor. The computer was still humming on top of the kitchen table, at the other end of the same bundle of fibers which sprang out of the wall jack and meandered across the floor and up one of the table's legs. He sat down at the table. The message "Download complete" was sprawled across the bottom left corner of the screen, and Pete saw that the module had been ejected and was lying loosely in the drive. He picked the tiny thing up—it had about the same size and shape as a bottle cap, if he remembered right—careful not to touch the contact strip with its stiff metal hairs. It sat like a shiny new nickel in the gnarled hands, full of possibilities. And fears. He could hear pa's voice in his head, saying exactly what he knew pa would have said: "If the Lord meant us ta . . ." were the first words out of pa's mouth whenever some new piece of technology came along. Pete suddenly remembered those long evenings out on the porch, arguing about such things while the mosquitoes hummed around them in the cooling air. He closed his eyes and listened to the mosquitoes humming in the grass, and felt pa and his ominous words beside him again. Pa had always thought that mankind would only come to a bad end, trying to outdo the Lord in what the Lord had given him. Pete had never understood such sentiments at the time of course; even after The War youth had kept him optimistic about things, and then when Molly came along, well . . . pa gave up after Molly came along.

The computer was still humming at him. Pete lifted the module up to the metal patch on his head, and neatly inserted it—it seemed to grab the patch and insert itself. Either way, he felt nothing; it was as though he'd tapped his head lightly, and then forgot about it. Nothing. Closing his eyes, he made another attempt at the Gettysburg Address. Again, nothing happened. How were you supposed to work this thing anyway? Now that he thought about it, it occurred to him that nobody had told him that. He'd just assumed it would be obvious.

He stood up as though he'd been stabbed by a hot needle, then spun around, only to be shocked again.

"Please lie down, and we will begin the lesson."

He started for the pantry closet, for the gun he hadn't fired in years. The voice cracked him from behind again, and again he spun. He felt his heart tighten with the realization: it was coming from *inside* his head! That—thing—was talking to him.

He clawed it out of his scalp, not knowing what stopped him from hurling it against the wall. Maybe it was the way his hand was trembling; he'd never seen it shake like that, not even that time—must have been thirty years ago, because there hadn't been any around these parts for that long—that big black bear broke into his house and he'd had to face it with nothing but a broom han-

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dle. Scared like he didn't know where his next breath was going to come from. He sat down again, fighting for normal breathing. Why hadn't somebody told him the darn thing would talk to him? He had a mind to go back to them and tell them what he thought of their almost giving an old man a heart attack like that. In fact—

Then he closed his eyes and pictured what Barclay and Glaser would do if he did that. They would laugh at him; oh, not at his face of course, but they would take no pains to hide what they thought. His face and ears stung red at the thought of facing the humiliation.

Then he thought of Molly.

Reluctantly, he reinserted the module, this time, resisting his instincts when it spoke to him. It didn't seem right to be lying down in the middle of the day like this; that was his last thought before the heaviness settled into his chest and the world around him retreated into a thin haze at the edge of universe.

He found himself huddling in his coat and stovepipe hat against the stark November weather. Edward Everett, the great speaker, had just concluded two hours worth of a passionate oratory that would be filling the headlines of the nation's newspapers in the days to come, but would then be forgotten to history. He, of course, did not know this; he only knew that the words had not stirred him, that they had not driven off the chill of the season, anymore than the five months since the battle had driven off the stink of death. But he had not come here for Everett anyway, whatever that professional mouth had to say. His only pleasure in the man's fire was in seeing it finally extinguished, for he knew then that what he had come all these miles for would soon be ascending that platform.

When it happened, he was disappointed. Despite the man's unusual height—he had heard that Lincoln stood over six feet tall—there seemed to be little impressive about the president. Lincoln looked common, just another man. Only the throng of soldiers which threatened to crush him indicated that there was anything important in the man. He shut his eyes and tried to envision how Washington or Jefferson would have looked on that platform. Like gods, he decided. One thing he'd heard was right though; the president didn't look like a man you would want to sit down at a table with a deck of cards. His small black eyes seemed to encompass everyone and everything in the crowd, shifting around as though they trusted nobody and nothing. Nor did he look discomforted by the cold at all, although he wasn't even wearing a hat.

Of course, perhaps if he had been through what this man had been for the last two and a half years, a thing like cold might not affect him much either.

Lincoln looked for a moment as though he were leafing through some papers in his hands, then the sheets mysteriously vanished and he was gazing into the crowd. "Four score and seven years ago, our fathers brought forth on this continent a new nation conceived in liberty and dedicated to the proposition that all men are created equal." He said the words, not spoke them like Everett; the president was talking to the crowd as though they were

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all his friends or brothers. Lincoln was talking to him.

It seemed like only seconds later. ". . . and that government of the people, by the people, for the people shall not perish from the earth." The great figure turned and walked down from the platform, accepted with tired but unyielding grace the handshakes from those fortunate enough to be near him, and then disappeared into the mass of soldiers. For a while he remained standing in the same spot, unable to believe that he had come so far to hear so little. He felt cheated. All that blather about brave men fighting and dying to defend the idea that all men are equal: they *were defending the sanctity of the* Union, God damn it, not some fool notion about the Negro being equal to the white man! Didn't the president see that if the rebel states were allowed to get away with secession, soon the entire nation would disintegrate? The fool!

Disgusted, he spat on the ground with such force that his hat nearly toppled from his head, and turned away to find a carriage that would take him back to his lodgings. His only consolation was that the speech had been so short it would undoubtedly be soon forgotten.

Pete opened his eyes and sat up in his bed, fully alert. It had not been a dream; his dreams always broke up when he wakened, into little pieces that didn't make any sense and which he forgot completely within minutes. This was as clear and solid as though he'd just gotten off that carriage and was going over the events in his head. Every word Lincoln spoke still rang in his head like a bell, and the cold and the smell of the graves was still in his nostrils. In short, if he hadn't known better, he would believe he really had just traveled back in time and attended a great moment in history.

He removed the module again, and studied it, not sure what to think. He felt the same as before; at least, licking the insides of his mind left the same taste on his tongue. It was just that —that it didn't entirely feel like his own mind anymore. Like he'd let someone else inside it and now he would have to share it. It was a feeling he didn't like.

"The implants work differently for different people," Doc O'Malley explained. "I—hope you don't find this *insulting, but—your experience* was pretty much the same as what children go through when they first start using implants. Until you learn how to access the database under your own control, the software feeds it to you in a way you can handle." She paused for a moment, and smiled; it was a strained expression this time. "I guess I should have realized that that would happen."

Pete frowned. "Ya mean, I ain't smart enough to use the implant right." The realization bit him with humiliating harshness. "I told ya—"

"I told you, the implants teach you to be smart," O'Malley interrupted. For a second he thought he saw anger descending over her face, but the cloud cleared almost as quickly as it had gathered. "It's like anything else; a skill you have to learn. It doesn't happen overnight, but you'll learn it all right. Everyone does, except the severely brain damaged—and your brain is as sound as anyone else's."

"Fer an old codger, ya mean," he

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completed the thought for her.

"If I thought that, I wouldn't have passed you on those medical questions. Stop it, Pete; you know me better than that." Her eyes were getting moist around red rims.

"Nearly scared th' crap outa me," he confessed. "Pardon me." He'd never used language like that in front of her before.

"I'm sorry. You're right; I should have anticipated it, and warned you. I'm sorry. Now you know, though. So what are you saying; that you want to have it removed? That can be done. If that's what you want."

He thought about it; not for the first time, but now that he knew it could be done, he realized he was being forced to a decision. "Doc?"

Her eyes were still wet.

"What're the implants really fer?"

The question obviously surprised her. "I told you—"

"I know what ya told me. Ya didn't tell me they get inside yer head like that. Make ya see an' hear what they like." He waited to judge her reaction before saying it. "It's doing things to my mind, ain't it?"

Body language answered his question. "It's *exploring* your mind," she explained, impressed by the distinction. "Once it figures out your mental processes, then it can teach you how to access the database in a more direct way. It's nothing to be frightened of. We all go through it."

She wasn't smiling as she spoke. Pete knew why. For the first time in thirty years she wasn't being straight with him. Not that she was actually lying; just not telling him the full and honest truth, the way she always had. He knew it quietly, like the way you knew that turning leaves meant winter was coming, or the way Molly knew she was in a family way even before her belly started swelling. Like there was no point in having opinions about it; you just accepted it and dealt with it as something you had no control over. Life was going to be different from now on. It made him feel strange in his guts; like he'd lost something he'd always assumed he would have. "So what yer tryin' ta tell me is, it has ta figger out how ta read me before I can read it." She wouldn't tell him the truth either, unless he stumbled onto it himself somehow.

She nodded, not quite seeing him. "That's about right."

He shook his head obstinately. He was missing something. If it could read him, then—then what? Why was she holding back on him?

She suddenly leaned forward and gripped his shoulders in both hands. "Believe me. It's not brain-washing you, or anything else devilish. Think of it as a teacher you keep with you constantly. In fact, it's better than any human teacher, because it knows exactly what you need and how you need it. And its attention is 100 percent personal; you don't have to share its time with anyone else. In short, it gives you exactly what education is supposed to be."

He waited for O'Malley to release him. "I hear you, Doc," he said when she did. "But it's more'n that too." Again, he didn't know. "I'll be honest with ya, Doc; it scares me. Scares me right down to the bones."

Maybe that was all. He was just

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scared. A foolish old coot, scared of what he didn't understand, scared because it was something no one had even dreamed of when he was a boy. Frightened like pa, out on the porch.

"What was that Doc?"

"I said, I'm scared of not having the implants. Human beings and the technology to destroy the world are a deadly combination if you don't have education." She gave him a piercing look. "You were in World War Two, Pete. Can you imagine a war of that—magnitude—with the technology we have today?" She didn't wait for an answer. "I'm not just talking about war either. Stupidity has become more dangerous than deliberate evil. I mean, do the wrong thing with nuclear wastes and you poison generations. And I hate to think about what something like biotechnology *will* do if we're not wise enough."

She took a deep breath, let it out deliberately. "That's why I thought it was so wonderful when you decided to get an implant. I figured, if you can do it, then there's hope for humanity after all."

Pete wasn't sure he followed everything she was saying, but the words felt right, he had to admit that. It eased his fears, at least some; it was the Doc O'Malley he'd known for thirty years. But he still knew she was hiding something from him.

"Of course, if you want to have the implant removed, like I said, that can be done. I can make arrangements any time you want."

He heard pa arguing with him. The mosquitoes in his ears.

"If they take it out, I won't get m'degree, will I?"

"No. I'm afraid not." She looked like she was going to say more, but she didn't.

He nodded, shrugged lean, hard shoulders. "Guess I got ta keep it then." He saw the confusion in O'Malley's face. "It's the way Molly woulda wanted," he explained.

"Molly?"

Pete knew it was hopeless, that there were some things you just couldn't understand unless you went through them yourself. O'Malley had never had a family, had never had kids of her own. But he had to try. No, he *wanted* to try. He took out his handkerchief and blew his nose noisily, what he always did when he was waiting for words to come to him. "When our oldest went off ta college, must a been the proudest moment a Molly's life." He grinned moistly. "She become a doctor too, ya know that? Works at some big hospital in Boston. Hardly ever see her; mebbe once ever' coupla years. Last time was when they laid Molly ta rest. Must a been—must a been—" but he couldn't remember. Before the big storm though, before the oak. Everything before that was kind of far off, as if in a haze. "She done good. I'm proud a her too."

O'Malley was trying to look like she understood. "I see. So seeing her children go to college, Molly pushed you to finish your schooling."

He had to bite his tongue. Course Molly never pushed him, not exactly anyway, not intentionally for sure. But Pete knew that trying to explain it would be hopeless. "Somethin' like that.

"So, ya see, I got ta do it."

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It was a few moments, moments in which she looked like she was thinking about something else, before she said, "Well, whatever your reasons, you won't regret your decision. I guarantee that."

He studied her through pinched eyes. "No; I 'spect I won't. Well!" He suddenly slapped his legs with such force that the sound echoed through the tiny room. "Guess you've spent enough a yer time talkin' to an old fool." He stood.

She followed him up and shook his hand. "Cut it out, Pete. You aren't a fool, old or not. And you know it." A warm smile melted some of the tension still in the air.

"Yeah." Pete said, "I 'spect yer right 'bout that too. Only, I wish I could stop bein' scared."

"There's nothing to be afraid of." But the mechanical repetition of the claim only had the opposite effect. He thought one last time to challenge her, but couldn't do it; if he was wrong—he figured he didn't have another thirty years to build their relationship again.

He stopped by Molly's grave on the way home. The headstone hadn't changed:

MOLLY ABELSON
1928-2003

Beside it stood the smaller stones of the two sons he had lost. One had been a stillborn; he figured it didn't count, there hadn't been anything he could have done about that. The other—he had known that old chain saw needed fixing, that he shouldn't have let Ben use it. Still, if Doc O'Malley had been there, she could have stopped the infection in time. As it was, by the time he'd managed to get Ben to a doctor, the boy was already gone. If he hadn't been so stubborn, hadn't insisted that an Abelson always pulled through—

"I know ya never forgive me for that." Course she never said anything. But there was a coolness about her afterward that had never entirely went away, not even after the girls came. A coolness she had taken with her to her grave. Pete could feel it even now, even after the years he'd stayed away from this place. An end-of-summer chill, a muting of the crickets that made him shiver inside with expectation. He'd lived with that melancholy anticipation of winter for half his life; she had never let him forget, yet was never obvious enough to give him cause for protest. It was as if the Lord had used her for his vengeance.

It seemed as though he turned from the silent graves even before he heard the sound. Perhaps that was because it started so subtly, so gently; a thin crackling in the distance, like embers snapping in a fire, or a thunderstorm breaking over the next valley.

He stared into the forest, in the direction the sound had come from, but saw nothing. But the sound gathered in force, and quickly cresendoed to an immense, crashing climax. It echoed for a while through the thick wall of trees, and finally died along with the eddies of smaller reports which had gathered around it like falling dominoes. Finally it stopped altogether, and then there was an opposing silence to match. Only gradually did the symphony of birds and the rustlings of small animals return to the usual level, insisting that nothing had happened.

Sometimes, it happened like that.

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The old trees were usually felled by storms, but sometimes they went of their own free will. Like they knew that their time was up, and they saw no point to hanging on out of sheer stubbornness. Like they knew that the ground had to be cleared for new growth. Pete knew that somewhere out there an oasis of sunlight had formed in the forest; and that by spring, seedlings would be fighting over the new territory.

He continued looking in the direction the sound had come from for a few more minutes, then headed off towards the house. He did not look at the graves again.

Another summer departed. The snows did not melt until March, and spring only brought rains which turned whatever passable roads that were left into invincible quagmires.

Still, the pick-up truck—once red but now so mud spattered that only memory could reveal that—fought its way through the slippery ooze which would again be a carpet of dust in a couple more months. For almost an hour it had struggled with the impenetrable muck; half a dozen times at least it looked as though it had finally gotten stuck for sure. An hour. In good weather, that was walking time.

O'Malley knew it would be too late. Her hand-held was already essentially telling her that, but she did not need that crutch to tell her that Pete could not have survived this long. The readouts showed that the infarction had been too massive. Still, she grabbed her black bag and all its miracles with her, and made a mad dash for the front door.

"Pete!" When there was no answer, she went back for her axe, and used it with irrational fury on the door, not even checking to see whether it was locked or not. The porch floor swore its protests under her feet.

"Pete!"

He was lying on his bed, eyes closed, a quixotic smile frozen on his face. The sight of the placid expression stopped her: a heart attack like that—he should have been grimacing with pain, or at least folded over the table, his hands clutching his chest. Instead, he looked as though he'd just drifted off, and decided never to return.

Then she realized; he had been somewhere else when it happened. A quick probe of his scalp found the nickel-sized disk, still firmly attached to his implant. She pulled out her hand-held, and confirmed that it was still sending its distress signal, along with streams of data—data which she fully believed now only because she saw it with her own eyes. Only the most primitive of residual brain activity was left.

She slumped to the floor and cried for a while. Then she went to the kitchen and logged herself onto the net through the still humming computer. The necessary calls were made in a precise, businesslike fashion. They would be here in a couple more hours.

It had been seven months. O'Malley tried to do the calculations in her head, but she was never very good at these sort of things. She knew that the older the brain was, the longer it took for the mental patterns to be deciphered and uploaded. Say, two or three months for Pete, but there was little experience with someone his age; it also depended on how often he used his implant, but

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she had no way of knowing that now. The fact that he had still been interfacing in this primitive way was probably cause not to be optimistic, but she just didn't know. Perhaps another month or two. That still left several months to upload eighty-two years' worth of knowledge and memories and experiences onto the net. Not a lot of time. But perhaps it had been computed. She could only hope.

She inserted the module he'd been wearing into the computer, and clicked on the "Upload" command. The drive whirred and hummed for several seconds, before the message "Data verified: no additional entries" appeared on the screen. She breathed easier, although she knew that still didn't mean for certain that everything had been transferred.

Of course, whatever had been received, however incomplete, it was still an addition to the storehouse of human knowledge and experience that the living would benefit from. Pete's death had legally freed that knowledge for all mankind. She made a mental note to start scanning the data base the first opportunity she got.

She went outside, in the mud and drizzle, and stood beside the metal dish, waiting for them to come. Beside her, one of the several oak seedlings which had taken root in the clearing was struggling toward the sky. ■

●A house in ruins can always be restored—what a pity it is that nothing can be done for beauty once passed!

Jean de La Fontaine

●There are plenty of maxims in the world; all that remains is to apply them.

Blaise Pascal

●To believe everything is too much, to believe nothing is not enough.

German proverb

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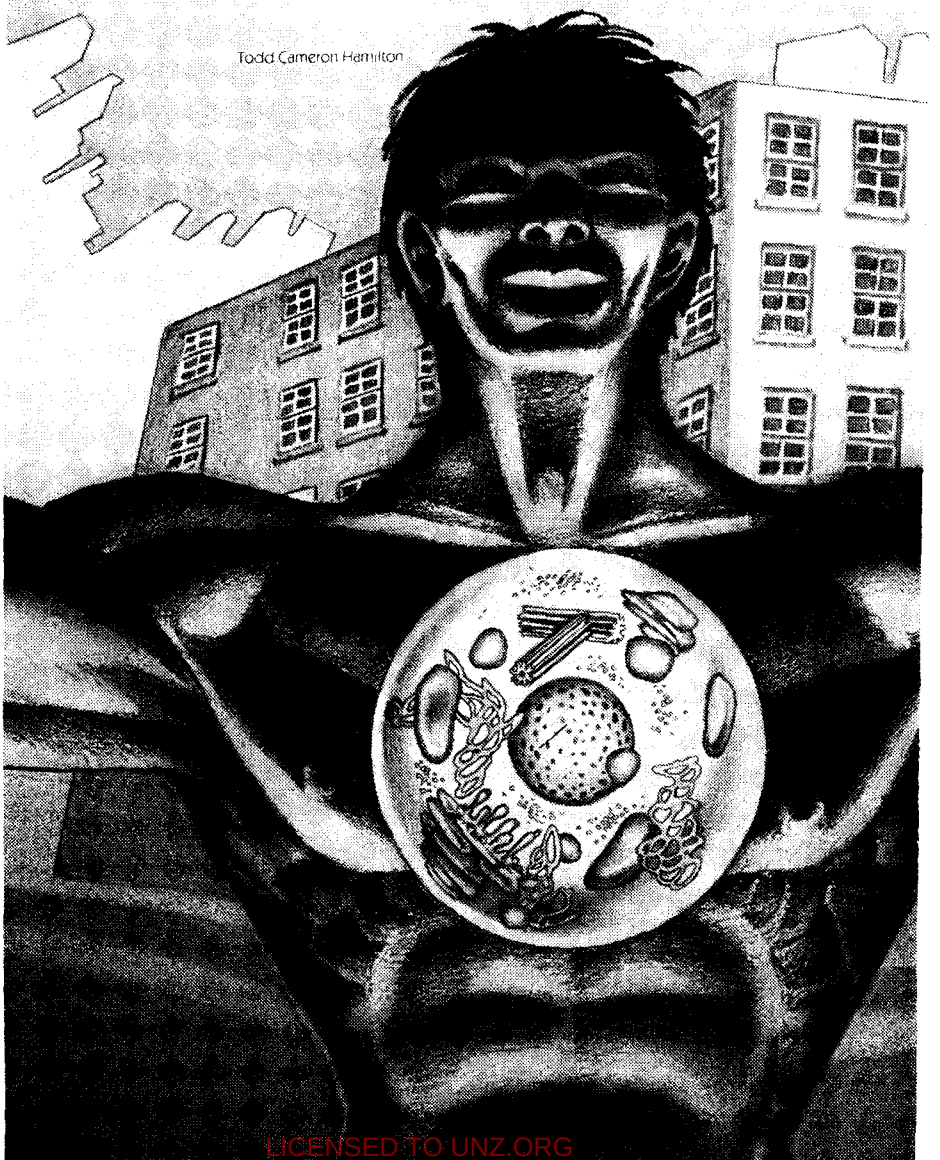
A good politician should know his constituents—which may occasionally involve large surprises . . . .



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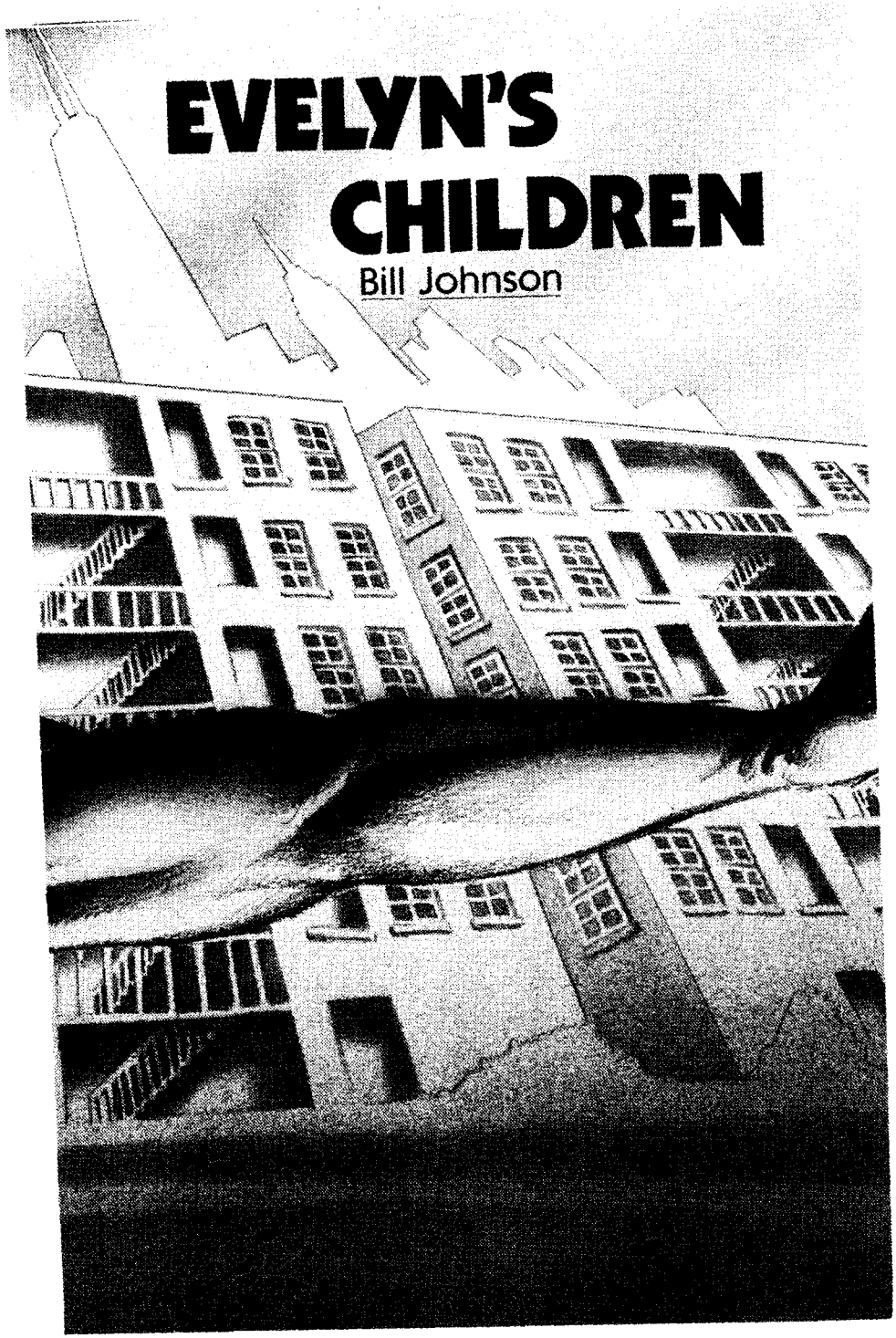

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"We have a problem."

The President picked up a printout of the latest poll results off my side table and leaned his elbows on my desk. I looked past him, out through my office window overlooking the White House lawn, to the street where the usual circle eight of demonstrators paraded in front of the wrought-iron fence. I wondered idly what the cause was this week.

"Why are we losing?" he asked.

"I don't know."

He stood and looked down at me. For a moment he flashed that famous "megawatt" smile, as the news channels called it. Then I watched the smile fold itself up and disappear.

"It's your job to know."

I leaned back in my chair and wished for a cigar. Or a beer.

D.C. lazed in the summer, the heat and humidity a reminder of Washington's past as a malarial swamp. The President was ready for his annual fly-fishing expedition to the Rockies, and the press, like dogs in heat, were right behind him. The cabinet was scattered. The Congress was in summer recess, the members on their usual junkets and "fact-finding missions" to every spare beach, European capital and four-star restaurant they could find around the world.

Then this . . .

"The party in power always loses in the midterm elections. It's like a tradition. We lose a dozen congressional seats now, then when you go for reelection, we gain them back. This may be a little worse than usual," I said, and shrugged. "Don't worry about it."

"I'm head of the party as well as President. I've got to think of the senatorial, the congressional, hell, even the state legislature elections. Not just my reelection," he scolded me. "Now, why are we losing so badly?"

"It's the census."

The way I said it made him stop. The census was the wild card in any plan.

"You have something," he said.

"Preliminary," I said reluctantly. I opened my briefcase again, handed him a report, sheets and sheets of numbers, all tallied against the census districts. He scanned them briefly, and checked for districts he knew from past campaigns. After a moment he stopped and pointed to a North Side Chicago district.

"This isn't right," he said. "I know this district. I know every hole in the wall where you can buy coffee in every precinct in this district. These numbers are way too low."

"It's like that all through the preliminary census reports," I said.

"Everyone's districts?" he said, hopefully.

I shook my head.

"Some opposition party districts, some of our districts. Particularly in the urban districts, the counts are way off, way too low."

"Our greatest strength is in the urban districts," he said quietly.

"I know," I said.

"We have a problem."

We have a problem.

I never liked that phrase.

Somehow, it always translated wrong. Into *I* have a problem.

Chicago in August was hell. . . .

A strong wind rolled up from the southwest, mixed with the heat reflected from all the concrete and asphalt, and

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the humidity from Lake Michigan, to produce a natural steam bath. Throw in the stench of diesel exhaust, the racket of jackhammers and car horns and boom boxes. Season lightly with a mass of hardened Michigan Avenue shoppers, determined to get from one air-conditioned department store or boutique to another as quickly as possible, no matter who or what was in their way.

Chicago in August.

At least the pizza was good. . . .

Broca watched as I finished my meal and pushed the pan away from me, a few greasy crumbs the only remnants of my quick visit to cholesterol heaven.

"Someday you're going to die, and someone is going to have to autopsy you," Broca said. He looked the same as always, pale and gloomy and unhappy. I don't think he ate much pizza. "With all the grease you eat, they'll probably have to wear a bib."

"What's the use of leaving a healthy corpse behind?" I said.

"Your poor triglycerides," he said, and shook his head.

It was good to see him.

"What have you got?" I asked.

"Sore feet. A small migraine headache. And a fresh respect for large dogs and the people who own them and don't want to be bothered by census workers," he said. "Plus something special I want to show you."

I paid for the pizza and we went back outside. I waited while he took out the census report for the district I wanted to visit. Then we started walking.

I always told candidates to schedule walking tours as a regular part of their campaigns. Television, radio, print, debates, all of that stuff was important. But besides being good television copy, a walking campaign always brought a candidate a fresh point of view. They *saw* things close up. They saw the faces, smelled the breath, heard the children and stereos, felt the handshakes of the voters—made the candidate more thoughtful, more sincere.

But I never told campaign managers to walk.

We stopped in front of a building. Broca folded up the census report. He turned to face me.

"Start counting," he ordered.

I shrugged and counted. Eighteen stories, lots of balconies filled with charcoal grills and plastic backed lawn chairs. A few tomato plants grew in large decorative clay pots. The fenced-in parking lot in the back was filled with an assortment of expensive cars, domestic and imported. If ever a building screamed condo, filled to the brim with voters, it was this one.

"All right, I've counted."

"It doesn't exist," Broca said.

I looked at the building again.

"Doesn't exist?" I asked.

"According to the census," Broca answered, "this building does not exist. It's not on their lists, and not a single census form was returned from this building."

"The census sends people around to do a manual check," I reminded him.

"No one was home," Broca said.

"*In an eighteen-story building?*" I asked.

"According to the census," Broca repeated. "Their records show no one was home. Not a single person. So by the logic of the census, no one lives here. None of the residents was

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counted."

"*Give me the report,*" *I said.*

I shook my head. I was tired and hot and my feet hurt. I took a deep breath and checked the report again, address by address.

The building was not listed.

I stopped at that, looked up at the building, and carefully sat down on a bus stop bench. I checked a third time, got the same result.

"That building is full of voters," I told Broca. "*I want those votes.*"

"I'll do what I can. And you?" Broca asked.

"I'm going to talk with the census bureau."

Now, I had the same confidence in government efficiency that everyone else had. I'd read about the gold-plated hammers and toilet seats, and I'd done enough digging to find out about other things that were even worse, but never made it into the press.

But how the hell did you lose an eighteen-story building?

I needed a beer.

The local census supervisor wore the same bored expression as the civil servants in D.C. It never changed during our entire conversation, most of which he spent staring out the window.

An undercount? Very interesting. No, they'd canvassed the area twice, on foot, after the usual mail-in survey. Did the numbers change? Very little.

Missed an eighteen-story building? Possible. Possible. Someone will look into it.

Change the census numbers? What an amusing idea.

Not a chance. Unless people came in personally, brought along convincing evidence of residency at that time and place, swore they never filled out the forms or talked with a surveyor, and generally convinced the census bureau they made a mistake.

"No, I don't think it has ever happened," he said slowly, with a smile. "But anything is possible. I suggest you just keep on trying.

"Thanks so very much for coming. We'll certainly look into your report."

Outside his office, I heard a heavy *thunk*. I've spent enough time in bureaucracy to know the sound of paper hitting the bottom of a recycling bin.

In the old days, when I was younger, people like that used to bother me. My face would flush, adrenaline surged through my system, and I nurtured thoughts of holy revenge.

Now I was older, more mature, more realistic in my outlook. Petty revenge was beyond me.

Instead, I pulled a few strings and called a massive IRS audit on his last seven years' worth of tax returns.

When I hung up the phone, I felt much better.

White House credentials are much more important outside the Beltway then inside D.C. I found this out when I threw my weight around in the local party headquarters. The local chairwoman, her waist expanded from too much of that good pizza, called in her troops and put them to work on the recanvass of the area.

She promised results in three weeks. I told her I needed them in one week, to do any good in the midterm elections.

She said it was impossible. Not

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enough people, too much territory, etc., etc.

I mentioned we needed a new undersecretary to the assistant secretary to the Secretary of Something Really Important. A woman was preferred, to keep our ratios in proper shape. Did she have any ideas on a woman who might be interested in such a position?

The chairwoman sat up straight after that, and made a few phone calls.

We compromised on one week, and I told her to give me a call when she had the results.

I caught the next flight back to D.C. The midterm elections were getting tight, and I couldn't stay any longer. Broca promised to keep working on the building problem. I made the tough decision, to leave the beautiful weather of Chicago in August.

I did take a frozen pizza with me.

Two days later I knew the midterm elections were going to be worse than I promised the President. The party was in for big losses, enough to lose our majority in the House, possibly even the Senate.

We weren't far behind nationally, just a point or two, but we were that far behind in too many races. If this kept up I might have to give up the window office in the west wing of the White House.

Finally, I threw all the poll results in a pile on my desk and went home. My mind was on that frozen Chicago-style pizza in my freezer when I shut the door to my apartment behind me.

I sniffed the air.

Cigarette smoke.

I use cigars, myself.

I threw myself to the side, at the same time I hit the light switch. I figured anyone whose eyes were used to the dark would be momentarily blinded.

At least, that was how it was supposed to work.

Instead, I ran head first into a granite block that wore a well-tailored silk suit.

The granite block was very nice to me. First he let the little bright lights stop dancing in front of my eyes. Then he picked me up and dumped me onto the couch and sat next to me.

And he even brought his brother, who moved to stand between me and the door of the apartment.

Then I noticed the woman.

She was attractive if you like short, heavyset women in Fifth Avenue clothes. She sat in my favorite overstuffed chair. Her hair was gray, the bones of her face solid. The cigarette in her hand looked like a toothpick.

Since everyone in the room outmassed me by at least fifty kilos, and the greatest exercise I'd had in the last year involved the wrist action of lifting a heavy beer stein, I decided against tossing them bodily out of the apartment.

"We need to talk with you," she said. Her voice was oddly musical, a gentle soprano.

"I have an office. I make appointments. I'll set you up for a week from Thursday," I said.

"Very funny. No, this is something we wanted to do immediately. You've started an investigation of census results in Chicago. We want it stopped."

I waited.

"The census is as accurate as we want it to be. There is no need for a

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recount," she said.

"That's not what the mayor of Chicago said," I replied.

"The mayor wants the numbers to be higher, so she gets more state and federal aid," she said. She knocked ash off her cigarette into an ashtray.

"She'll get her money, one way or another. We don't cheat anyone."

I stopped for a moment. She and the two silent men looked similar enough to be brothers and sister.

"I need something else before I shut down the investigation—" I said. She shook her head.

"We don't vote. That part you'll have to do without us."

"You're not giving me much of an incentive to stop the recount," I said.

She sighed. She pulled a checkbook out of her purse.

"We have a small political action committee. Just a little PAC to help those people who help us. We'd like to make a contribution to your party. Can you suggest a nice figure?"

"The people in that building are Neanderthals," Broca said.

"Well," I said, "I wouldn't go that far. They have a nice little PAC. Their campaign contribution technique might need some work but—"

"No, no, no! I'm serious. I meant they are *Neanderthals, Homo neanderthalensis*. Actual members of that species."

I was silent for a moment. We sat in the back booth of a little Chinese restaurant in Georgetown, the only light from the candles on the tables. Broca's face was in shadow, but he seemed sober.

I took a long drink of my beer.

"Neanderthals. Cavemen. You're telling me a bunch of cavemen own a condo in Chicago," I said.

"Well, I suppose they were cavemen once," Broca mused. "Everyone probably was. Gives you good protection from the elements and there are plenty of caves. Safe enough once you've evicted any other inhabitants, and we've certainly found enough remains of—"

"Broca, the Neanderthals are dead. Extinct. The phrase forty thousand years dead comes to mind," I said.

"Really? You're sure they're extinct? Describe a Neanderthal to me," Broca challenged me.

"Well," I stumbled, "lots of muscles, I suppose, and long arms, heavy facial bones. Hell, you know what I mean! The picture you always see at the museum."

"Which is based on a single skeleton, found in the 1800s. Later on, researchers decided it was an old man, bent and crooked from arthritis. Not much of a representative of a species that was quite successful for tens of thousands of years," Broca said.

"So what does a Neanderthal look like?" I asked.

"Shorter than average, perhaps," Broca said. "But not so short we'd really notice. Strong. Heavily built."

"You just described half the people in Chicago," I said.

"I just described the people who gave you that check," he pointed out.

I stopped, took a bite of my kung pao shrimp.

"How'd you find out?" I asked.

He shrugged.

"I have some friends who are doctors

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in Chicago. They treat some of the people in the building. I got access to the right medical records," he said.

"That's illegal," I said.

"Right," he said.

"And?"

"One of my friends noticed the similarity of the people in the building. She got curious. She did some research on some of them who came in for outpatient surgery. Examined the tissue a little more closely than usual.

"It turns out their mitochrondria is unique. They certainly are not Eve's children."

I ate more shrimp and counted to ten.

"Who is Eve? You mean Adam, the Garden of Eden, that kind of Eve? I hate to tell you this, Broca, but religion doesn't have anything to do with your right to vote in this country. And that's what I'm interested in," I said.

"Religion has nothing to do with it," Broca said. "Everyone has mitochondria in their cells. They're rodlike structures that handle a lot of the cellular enzyme activity. We live in symbiosis, in partnership, with our mitochondria. They have their own genetic code, apart from the usual DNA that makes up our heredity.

"You get your mitochondria from your mother. Father contribute's nothing to it. Sperm just don't have the room to carry mitochondria. It turns out that all of us, all the *Homo sapiens*, started with the same mitochondria. It's mutated so that everyone's is a little different but, if you trace it back far enough, everyone has the same mother. She probably lived in Africa, a couple of hundred thousand years ago.

"We call her Eve."

"And the people in the building?" I asked.

"Vastly different mitochondrial DNA from yours, mine, or anyone else's. And all of theirs is very similar. They are descended from the same mother, but not the same one as ours," he said and shrugged. "Call her Evelyn."

I finished the shrimp and rice, and chewed slowly. I refused another beer, and paid the bill. We went outside to my car.

The wind blew briskly from the northwest, a few fat raindrops tossed in for good measure.

"How many of these Neanderthals are there?" I asked. Broca shrugged.

"One percent. Maybe two percent. Of the total population. That's my best guess, but it would fit in with the number of people the census misses all the time and can never track down."

"So, they don't want to be counted," I said.

"No," he said. He hesitated. "But you need to count them this time."

"Why?" I asked.

"Because they're dying. All of them. The entire species. And you have to help them."

Broca set up the meeting.

Her name was Angela, and she was very old.

She never told me her age, and I never asked. She looked middle-aged, a light frosting of gray in her hair. Her face was lightly tanned, small crow's-feet at her eyes. She could have been the mother of the woman I met in my apartment.

Her age showed in the way she

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moved. Not gracefully, but efficiently, each foot placed carefully, balanced, as she walked. She kept her hands still, used her gestures with great economy. Her face was calm and composed.

I bet she was one hell of a poker player.

"Sooner or later, it was bound to happen. Someone was going to find us someday," she said resignedly. She touched the papers I brought her, moved them around on the table, then ignored them.

"What do you want?" she asked. Her eyes locked on me.

I opened my mouth, the opening speech ready. Ever since Broca made the opening contact with the people in the building, ever since we flew back to Chicago for this meeting, I had rehearsed the speech, refined the speech, practiced the speech.

Then I looked in her eyes.

To hell with the speech.

"You're dying," I said.

"Trite, but true," she said. "Everyone dies."

"I'm not talking about an individual's death," I said. "Your species is dying. We don't have all the data, but we have enough to be sure. Your birth rate is down over the last fifty years, cut more than half, and the trend line is still down. Your cancer rate is up, particularly malignant melanoma, and that trend line is going up. At this rate, I figure the last Neanderthal should die sometime in the next century."

"Species die out all the time," she said. She smiled, her teeth thick and blunt, almost peglike in her strong jaws. "We've lasted longer than most."

"Cut the macho crap," I snapped. I stood to leave. I've been in enough negotiations to know that sometimes you have to kick the other side in the teeth to get their respect.

"If you want to go into extinction, all that 'gentle into that good night stuff,' well, then we don't have anything more to talk about. I'll tell someone to put daisies on your last grave, and we won't bother to rewrite the history books. If this is how you want to die, then it doesn't much matter whether it happens now or forty thousand years ago. Hell, it'll save a lot of trees if we don't have to reprint all the damn history books," I said.

I picked up the papers and shoved them into my briefcase. Broca stood next to me, his face pale with shock.

"Sit down," Angela said. I stopped, looked at her, my face blank. She smiled again, and this time it was for real. I sat down.

"We've hidden among you for ten thousand years. Our early history isn't any more clear than yours, but our first records show us living, quietly, among the humans. We knew we were different, and it was obvious from the ethnic wars and hatred that humans reacted violently to anything that was different.

"We learned to hide, to blend in. We paid our taxes, we fought when we were drafted, we were good citizens. We did anything we needed to do to stay out of the way, to avoid notice," she said.

"Computers make that harder," I said. She nodded.

"We can't let ourselves be counted anymore. The census provides public demographic information. Nothing specific, but general information. That information is then fed into the computer

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networks. We're well enough organized that we've helped each other succeed economically. Some of the breakdown groups will be Neanderthals, and no one else. When the ad agencies study the data, we'll be broken out as a sub-group of consumers, just from our answers to the census. At first they won't know they've identified us, they'll just think we're another unique consumer group. But when they investigate a little further, to get more information, we'll be identified," she said.

"So you bribe the census takers," I said.

"That's part of it," she agreed. "And we give the right contributions here and there, use our PAC money to help candidates that push for privacy laws, support the lawyers that fight to keep personal information secret. Things like that."

Things like that.

For a moment I remembered the large, quiet men who visited me. I thought about a secret kept for thousands of years and what it took to keep such a secret well hidden.

I pushed those thoughts away.

"You're dying out now," I said.

"Yes," Angela said. She looked tired suddenly. "I think your estimate of a hundred years is generous."

"What's causing it?" I asked. She shrugged.

"We don't know. We've done research, but we haven't found the answer." She looked up me. "It isn't just us, you understand. Check for yourself. Every industrialized country has a declining birthrate, once you adjust for immigration. And cancer is going up. Something in industrial civilization, something we don't understand, is killing us. Individuals live longer, but they have fewer and fewer babies. The more advanced the country, the worse the problem. Our luck is that we seem to be more susceptible to whatever the problem is. We're just getting hit harder and earlier than you."

I glanced at Broca. He nodded.

"That's true," Broca said. "But someday, we'll find the solution. When the problem gets big enough, when we recognize it as a problem, we'll launch the research needed to fix whatever it is that's killing us. You, however, are a small group," he said carefully. Angela waited. "You don't have the money or expertise to carry on large-scale research. Even if you did, you can't keep such research quiet. For you to solve your problem, you have to go public."

"We'll never do that," Angela insisted.

"Only a government can conduct the kind of research you need," I said. "Only a government has the money, the people, the resources. The legal authority to ask the questions and analyze the results. We'll solve our problem. The question is whether any of you will be around to share the cure when we find it."

"I agree," she said slowly and warily. "So where does that leave us?"

"I need your votes," I said. "The party is losing. Not by a lot, but we're losing. If we lose the House and the Senate, we can't help. The opposition will never provide the funding you need. If we win, I'll make sure the research you need gets started."

Angela was silent for a moment. She stood, walked to the window, slid the

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drapes aside and looked out at Chicago; Lake Michigan like a black velvet frame for the towers of the Loop.

"If we vote, we'll be noticed. Not right away, but if we change the outcome of an election, we'll be noticed," she said.

"Better noticed than dead," I said. "And if you're part of our organization, a pressure group of *voters* inside our coalition, you'll have protection."

She turned her head back toward me and smiled. It was like a winter blast off the Lake.

"We've seen the protection a minority can get from *Homo sapiens*."

"You need to make a decision," I said. Angela turned away from me to stare out over Lake Michigan.

"I know."

A long time ago, I was a junior sales rep. An old hand took me aside one day, and told me to shut up and stop talking. In every deal, he told me, there comes a time when everyone falls silent. The decision must be made.

And the first one to speak loses.

I stood, picked up my briefcase, and motioned to Broca to follow me. One of the guards opened the door. I glanced back as we left, and saw Angela at the window.

I shut the door quietly.

The polls stayed stubborn, just enough against us to lose the House and the Senate. It was so close that our candidates were within the polls' margin for error. The high end of the margin, granted, but we could still win if we got all the votes in all the margins for error. Unlikely, but possible.

So I sent the President out on campaign sweep after campaign sweep to help our local candidates. I lived on coffee and sugar, ate enough greasy chicken at fund-raisers to double my cholesterol level, and did everything I could to turn what was left of my hair gray.

Angela never called.

Broca tried to see her, but the polite guards at the building turned him away. The census numbers for Chicago were adjusted enough to keep the mayor happy. One day, suddenly, the condo building was sold to a developer for conversion to an office tower, and everyone who lived in the building vanished.

Election night was a nightmare in slow motion.

Every network ran an election special that night. Every network had a stable of experts. Every network ran an exit poll of voters.

Every network projected us as losers.

Around midnight, California time, the first retractions ran.

The last votes were counted in New England, in an election for the House. The network projection showed us losing this particular seat by a couple of thousand votes, just a single percentage of the total cast.

The problem was, we got more votes than the polls expected.

The networks went back on the air, live. No one beat the projections any more, it hadn't happened for decades. The polls were that good these days. Once the networks projected a winner, that was it, the loser was supposed to politely make the necessary calls and issue the obligatory concession speech.

Voters weren't supposed to mess up

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the networks.

Slowly the last votes trickled in, the last network anchor signed off, the last seats in the House and Senate were decided.

We won.

"Did she ever call?" I asked Broca. He shook his head.

"Nothing," he said.

I chewed my lower lip for a moment.

"Did she really do it, Broca? Did she really get us the votes? Or did we get a last-minute surge? What really happened?"

"I think you have to decide that," Broca said. "They've vanished again, and I don't know where. I don't know if this election was some kind of an answer. All I know is that we were supposed to lose, and we won. Who gets credit for it is up to you."

I stopped for a moment, then shrugged. I picked up the phone, called the President. We spoke for a moment, then I put my hand over the mouthpiece of the phone.

"This fertility thing is a problem for us anyway, right?" I asked Broca.

"Absolutely," he said. And smiled. Sometimes you got to deal. . . . ■

●You cannot bring about prosperity by discouraging thrift.

You cannot strengthen the weak by weakening the strong.

You cannot help little men by tearing down big men.

You cannot help the wage earner by pulling down the wage payer.

You cannot further brotherhood of man by encouraging class hatred.

You cannot help the poor by destroying the rich.

You cannot establish sound security on borrowed money.

You cannot keep out of trouble by spending more than you earn.

You cannot build character and courage by taking away men's initiative and independence.

You cannot help men permanently by doing for them what they could and should do for themselves.

William J. H. Boetcker

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The Alternate View

SUPER-HEAVY NEUTRINOS: WHO ORDERED THAT?

John G. Cramer

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Neutrinos are peculiar particles. About 610 trillion neutrinos produced by the Sun are passing through your body in the second it takes to read this line. If it is midnight where you are, the neutrinos from the Sun are passing completely through the Earth in order to reach you. Because neutrinos have no electric charge and little or no mass, they interact with matter only through the two weakest forces, gravity and the weak-interaction. They can pass through solid matter almost as freely as through vacuum, and light-years of lead would be needed to absorb them.

There are three distinct "flavors" of neutrinos (e-, μ-, and τ-neutrinos) and they all have seem to have zero charge and negligible mass. Careful measurements indicate that if e-neutrinos have any mass at all, it could be no more than 2 electron-volts or 4 millionths of an electron's mass. Why do neutrinos, unlike their electron brothers and their quark cousins, have zero or near-zero mass? The present standard model of particle physics provides no way of answering this question. Unlike the photon, which must have zero mass because it is the mediating particle of the infinite-range electromagnetic force, there is no fundamental reason why neutrinos should be massless. They just are, as nearly as we can tell.

Or perhaps not. There is at present a growing body of experimental evidence that some neutrinos may have a mass of 17,000 electron-volts (17 keV) or about 1/30 of the mass of an electron. This Alternate View column is about these 17 keV neutrinos and their implications.

The radioactive weak-interaction process through which the neutrino first revealed itself is called beta decay and comes in two varieties, electron beta decay and positron beta decay. In electron beta decay a radioactive nucleus reduces its mass-energy slightly by converting one of its neutrons into a proton, emitting an electron and an anti-neutrino in the process. The excess energy generated in the decay is distributed randomly between the electron and the anti-neutrino.

Before the existence of the neutrino was suspected, it was assumed that only the electron was emitted during beta decay. If this was the case, the electron should carry away all of the available energy. Early measurements of electron energy, however, showed that the energy was not a sharp value. Instead it was smeared out in a lumpy distribution that extended from zero to the maximum energy available in the decay. Some of the energy was somehow disappearing, so that the books didn't balance in the energy column. Theoretical considerations also indicated another problem: neutrons, protons, and electrons all have an intrinsic spin angular momentum of ½ a unit $\hbar$. Therefore,

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in converting a neutron to an electron and a proton ($\frac{1}{2} \longrightarrow \frac{1}{2} \pm \frac{1}{2}$), the books didn't balance in the spin column either.

Wolfgang Pauli solved both of these problems at a stroke by hypothesizing the neutrino, another spin $\frac{1}{2}$ particle which carried away the missing energy, thereby preserving the laws of conservation of energy and angular momentum. Enrico Fermi was later able to use this idea to accurately predict the observed partition of energy between the electron and the neutrino in beta decay. This energy partition determines the spectrum of electron energies collected from a large number of nuclear decays.

The region near the high energy end of this electron energy spectrum is sensitive to the mass of the e-neutrino (actually the e-anti-neutrino, which should have identical mass). If the neutrino has zero mass, the distribution smoothly tails into the baseline. But if the neutrino has a small mass, the distribution is chopped off early, producing a "nose" with an abrupt edge at the end of the distribution. Careful measurements of electron energy spectra in this region, searching for such a nose, have produced the best upper limit (about 2 eV) on the mass of the e-neutrino. Similar considerations at higher energies have led to more generous upper limits on the masses of the μ-neutrino and τ-neutrino.

John Simpson of the University of Guelph in Canada was attempting to pull down the upper limit on the e-neutrino mass when, about six years ago, he found the first evidence for neutrinos with a 17 keV mass. To avoid scattering and absorption in the material that contains the decaying radioisotope source, Simpson implanted the radioisotope tritium, with a half-life of 12 years and a maximum beta-decay energy of 18.6 keV, directly, into the silicon diode detector with which he was measuring the energies of its emitted electrons. The technique, as it turned out, could not be

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used to improve the limit on the mass of the e-neutrino, but it showed an unexpected effect in the low energy end of the spectrum. There was a break in slope, a "kink," in the otherwise smooth electron energy distribution at an energy about 17 keV below the maximum electron energy.

It was a small effect which might have been produced if about 1% of the counts in the spectrum had been shifted down in energy by 17 keV. Simpson went to great lengths to eliminate the possibility that this was some artifact produced by electronics, cosmic rays, background radioactivity, or some solid-state physics effect such as incomplete energy absorption in the crystal lattice of the detector. Finally he convinced himself that he was dealing with a real effect. He found that the measured data could be explained if one applied conventional weak-interaction theory but assumed that 99% of the time the decay proceeded with a conventional massless neutrino, but that 1% of the time a neutrino with a mass of 17 keV was emitted.

Simpson published his results and proposed this explanation. The paper was met with great skepticism by most of the physics community. Many papers were published by others that suggested flaws in Simpson's measurement technique or proposed more conventional explanations of the data.

Simpson is a stubborn man and a careful experimentalist. Over the past five years he has carefully evaluated the criticisms of his original measurements and has carried out two new experiments, one again using tritium as the beta-decay source and the other using the isotope sulfur-35, a beta-decay source that emits electrons with a maximum energy of 167 keV. Both new experiments showed the same effect, a kink in the spectrum 17 keV below the maximum energy end-point of the spectrum.

Other experimental groups have recently begun to take an interest in Simpson's results. Groups at Oxford University, at the Institute Ruder Boskovic in Zagreb, Yugoslavia, and the Lawrence Berkely Laboratory have all made measurements that provide supporting evidence for the emission in beta decay about 1% of the time of a neutrino with a mass of 17 keV.

The Berkeley results are particularly interesting because the radioisotope used, carbon-14, was grown into the crystal lattice along with the germanium of which the detector is made. Since carbon and germanium lie in the same column of the periodic table and have similar valence properties, they can exist in the same crystal lattice structure without dislocations or imperfections. Carbon-14 has an electron end-point energy of 156 keV, and the energy spectrum shows the familiar kink 17 keV below the end-point. The leader of the LBL group, Eric Norman, estimates that there is a less than 1% chance that their result is a statistical fluke.

All of these results are preliminary, but the evidence is growing. The one worry that many physicists have is that all of the measurements showing evidence for a 17 keV neutrino have been obtained with radioisoptopes (^{3}H, ^{14}C, ^{35}S, and ^{51}Fe) implanted in either silicon or germanium crystals. No evidence of similar effects has yet been found using magnetic analysis of the electrons, a

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more standard technique for measuring electron energy spectra. Thus, there remains a lurking doubt that the measured effect may have more to do with properties of crystals than with neutrinos.

Nevertheless, let's accept the result for the moment and ask if a 17 keV neutrino can be fitted into our present understanding of fundamental particles. As I said above, there is no particular reason, within the standard model, why a neutrino could not have a non-zero mass, even a mass as large as 17 keV. But if any neutrino has a non-zero mass, all three flavors should. Since the decay into the 17 keV neutrino happens only about 1% of the time, it cannot be the e-neutrino and is probably the τ-neutrino.

Under the scenario that all three neutrino flavors have mass, it is expected that a beta decay will produce a "mixed state" with some probability of producing each of the three neutrino flavors. It is not unreasonable, then, that a τ-neutrino might be produced with a 1% probability.

The difficulties arise when we attempt to reconcile a possible 17 keV τ-neutrino with the neutrino-related puzzles of contemporary astrophysics. The first of these is the solar neutrino problem. Several detectors specially constructed to detect solar neutrinos have consistently detected $^1/_3$ or less of the e-neutrinos predicted by good astrophysical models. Superficially, one might think that a 17 keV τ-neutrino, taken as an indication that all three neutrinos have at least some mass, might solve the problem. Solar neutrinos might be thoroughly mixed and arrive at the detector as $^1/_3$ e-neutrinos and $^2/_3$ of the other flavors, to which most of the presently operating detectors are insensitive. Unfortunately, these facts seem to be pieces of different puzzles. A 17 keV neutrino would be so massive as to mix only at about the 1% level with the other two flavors. No consistent scenario has yet been devised which can comfortably accommodate *both* the observed suppression of solar neutrinos and a 17 keV τ-neutrino.

Another difficulty with 17 keV neutrinos comes from the dark matter problem. There is convincing astrophysical evidence that there is about 100 times as much matter in the universe as can be accounted for by counting stars and making plausible estimates of the additional matter in non-luminous gas, Jupiter-like non-luminous bodies, etc. The nature of this dark matter is not understood, but one of the most often-quoted possibilities is that it might arise from massive neutrinos produced in the early stages of the Big Bang.

One might think, therefore, that 17 keV neutrinos might solve the dark matter problem by supplying the missing mass. But once again, the mass is too big. A neutrino mass of about 3 eV (1/5600 of the suggested τ-neutrino mass) is all that would be needed to solve the dark matter problem. Indeed, if $^1/_3$ of the neutrinos made during the Big Bang were stable and had a mass of 17 keV, the universe would long since have recollapsed to a Big Gnab and we would not be here to worry about it.

In fact, the only way to accommodate the continued expansion of the universe with 17 keV neutrinos is to make them unstable to decay into lighter particles. Thus a 17 keV τ-neutrino might decay to an e- or μ-neutrino and a 17 keV

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photon or perhaps to two light neutrinos and one anti-neutrino. One might even balance the dark-matter books by retaining just enough un-decayed τ-neutrinos to provide the missing mass, while allowing the excess to have already decayed away. There are, however, a couple of problems with this idea. First, it makes the universe much too massive in its early stages to be consistent with standard cosmological models of the early universe. And second, there should be lots of 17 keV photons around to show that this is going on.

In fact, the recent data from the Cosmic Background Explorer (COBE) shows no evidence for red-shifted 17 keV photons from the early Big Bang. The only remaining possibilities are that there are no decays that make photons (unlikely) or that all of the decay was over well before the Big Bang produced the black-body photons that COBE is studying. That would mean that the half-life of 17 keV neutrinos would have to be less than 20,000 years or so. Such a short half-life, on the other hand, is difficult to reconcile with results from underground detectors which should see gamma rays from the decays of energetic solar neutrinos.

In other words, 17 keV neutrinos do not seem to solve any existing problems, but instead seem to produce new ones. This reminds me of a similar situation in the 1930's. Yukawa had predicted a middle-weight particle (now called the meson) that would supply the binding force between neutrons and protons. Then Neddermeyer and Anderson discovered the μ meson. It had about the right mass to be the predicted particle, but it was soon learned that it interacted too weakly with matter by a factor of a million to be Yukawa's particle. Wolfgang Pauli, on learning that the muon was not the key to nuclear binding, said in disgust "Who ordered *that?*" The same might be said for Simpson's 17 keV neutrinos. ■

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●The vice lies not in entering a bordello but in not coming out.

Aristippus

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THE 1990 ANALYTICAL LABORATORY

Photo credit: *Locus*, Jane Jewell

From left to right: Tina Lee, Vincent Di Fate, Ian Randal Strock, Michael F. Flynn, Scott L. Towner, Stanley Schmidt, Cynthia Manson.

Just in case you missed our July 1990 Double Issue, here's a list of our winners again:

"Weatherman," *Lois McMaster Bujold*—Best Novella

"VRM-547," *W.R. Thompson*—Best Short Story

"Sixty Astounding Years," *Michael F. Flynn*—Best Fact Article

December: *Vincent Di Fate,* for "Funnel Hawk"—Best Cover

The awards were presented at a breakfast celebration in New York City's Grand Hyatt Hotel, Saturday, April 27, 1991, during the Nebula Awards weekend. The prizes were given out along with *IAsfm*'s Readers' Awards. Despite the fact that winners Lois McMaster Bujold and W.R. Thompson were unable to partake of the festivities, the rest of us certainly enjoyed our gourmet vittles.

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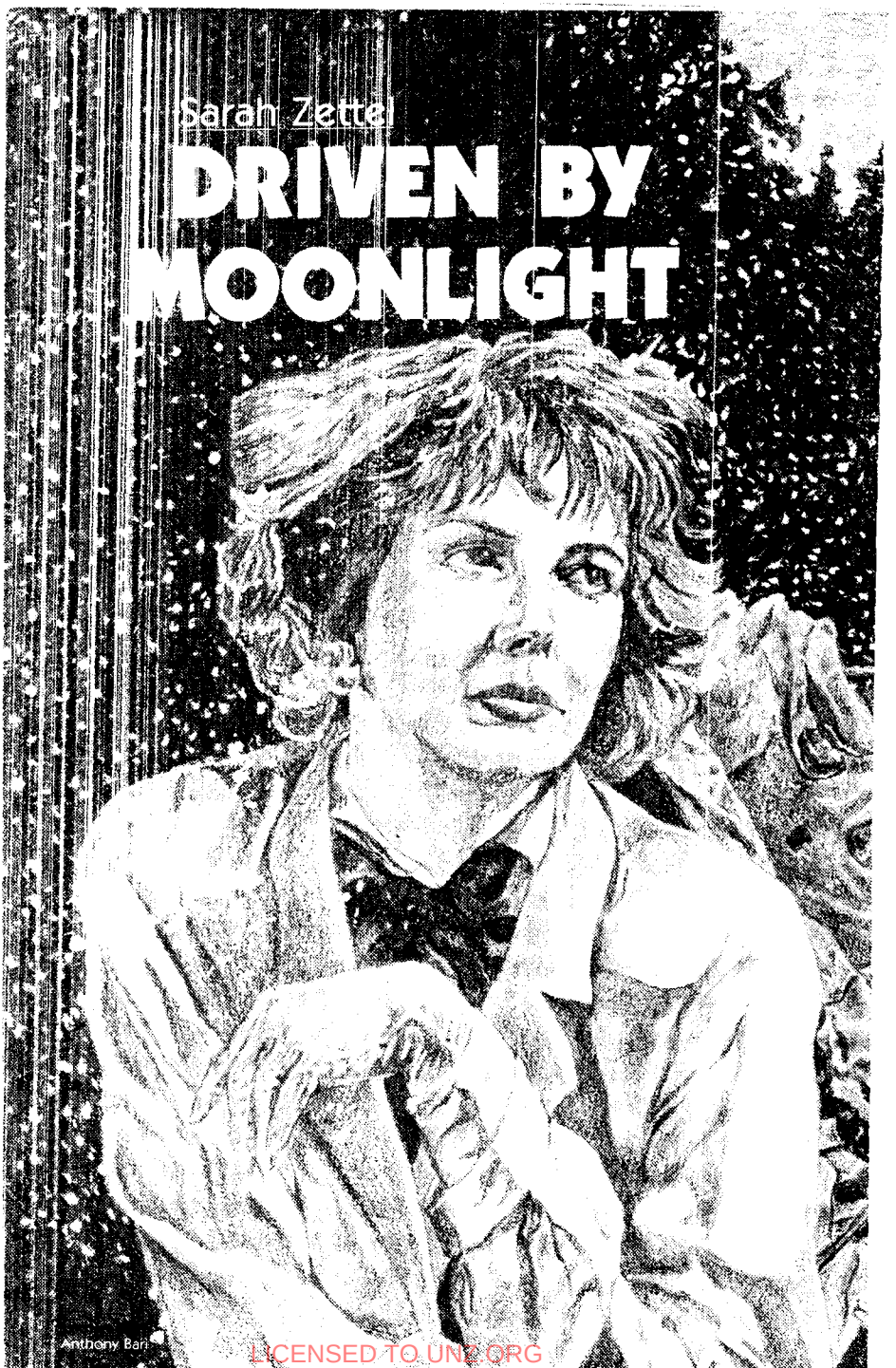

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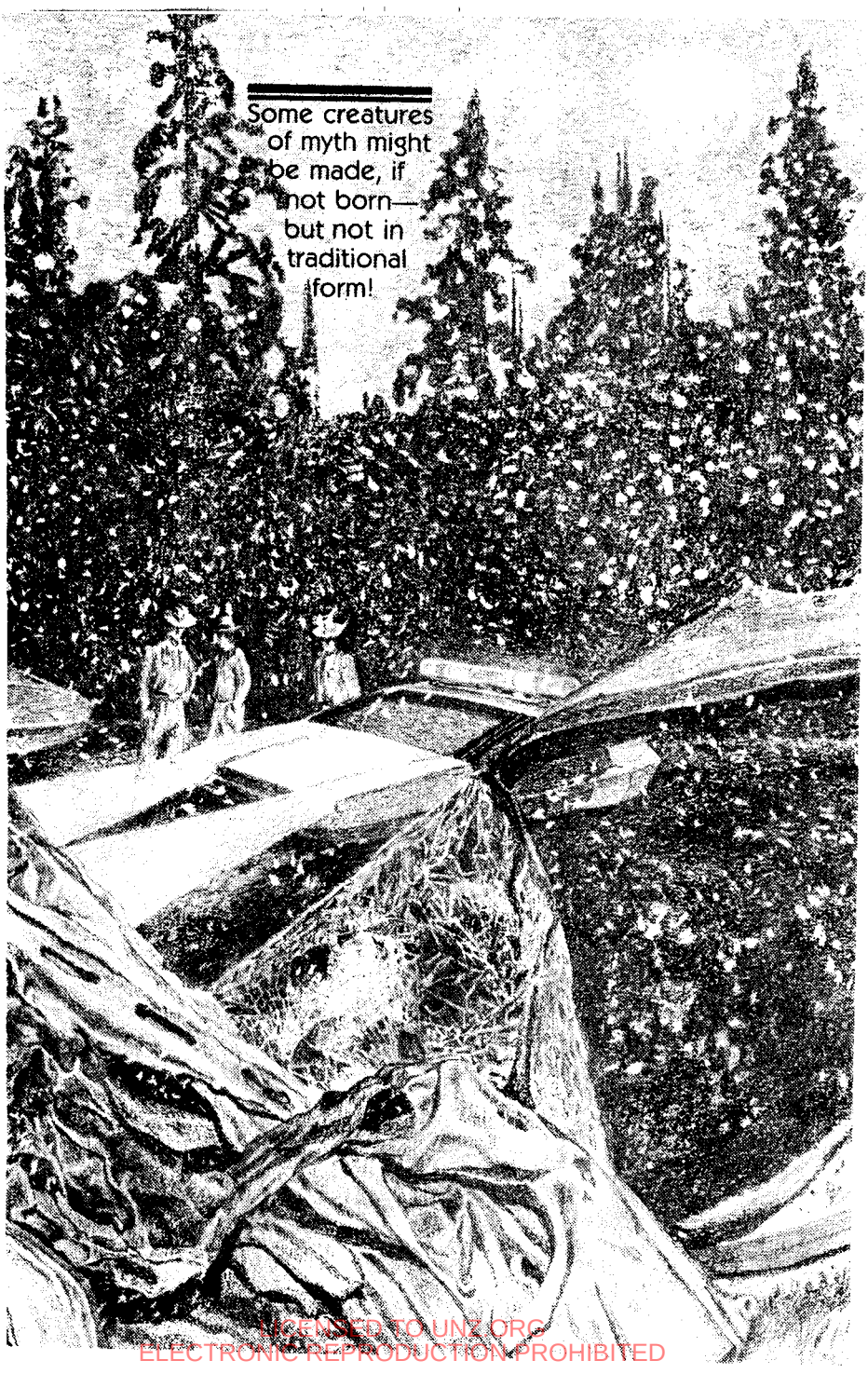

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"At least it wasn't the road." Davis, the county man, slapped the snow off his gloves.

Trish watched her breath mingle with the falling snow, tinted silver by a full Moon and car headlights. She let her eyes wander over the gouges in the drifts down to the metal and plastic heap in the icy creek. Water gurgled as it flowed through the wreck, washing away crimson stains squeezed from a living body.

The county was not liable for what happened to individual cars. On the other hand, Patricia Collins, ex-development engineer turned Senior Service Representative for SMART Transport Co., was liable for all the accidents involving cars with the SMART system installed in them, on any road. All the accidents, Trish winced as the phrase repeated itself inside her.

She made herself turn back to Davis. "Anybody see the other car?"

"No, but we know where it went." Davis nodded down the road.

Trish picked her way over to stand between the black lines the tire tracks slashed across the snowy road. "Unless it came from there." She eyed the mishmash of double tire tracks and footprints not five feet away.

"No chance," Davis was saying behind her. "The road's closed off that way," he waved ahead of them. "About twenty yards past the bend. The cops'll probably find some drunk collapsed in one of the holiday houses." He swept his hand around to include the hillside. The charcoal shadows of pine trees rustled as if in acknowledgement. "Ran that poor guy off the road and tried to get away, I'll bet."

Trish suppressed the shiver that wanted to ripple down her spine.

Heavy boots crunching on snow and gravel accompanied a flashlight beam cutting through the dark.

Trish glanced up at the Moon.

God? Let him be right, OK?

"What'cha got?" Davis called out to the two deputies trudging up the road.

"Nothing," answered the fatter of the two. "Tracks down to the roadblock, and back again. It's a mess, and the snow's not helping." He shone his light on the flakes coming in thicker as he spoke.

Trish looked down into the creek. God, you're not listening to me, are you?

"Were there footprints down there?" she dug her hands deep into her coat pockets.

"Yeah. A bunch. Some of them mixed up under the tire tracks."

Davis shook his head and Trish finally lost control of the persistent shiver.

"I want tire treads off the wreck," she tried to sound brisk. "And prints off the tracks by the roadblock. I want to know who the dead man is, and I want to know who the car is registered to."

"Yes ma'am," said Davis genially. "You got a theory?"

"Unfortunately." Trish turned away from him.

Unfortunately, it involves the fact that there was no second car and the poor guy was not run off the road.

She had to strip off her glove to tap out the door code for her Escort XX. It came open when she touched the last digit and, gratefully, she bundled her-

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self inside. As quickly as she dared, she eased her little box of warmth and civilization through the narrow world picked out by the headlights.

After what felt like a year's trek through looming trees and twisting hills, she accelerated onto the steaming highway. A blue light on the dashboard blinked on, telling her the car was firmly on the SMART road.

The acronym stood for Signal Maintained Automated Road Transport. The simple dashes that used to mark the lanes had been replaced by strips of silicon chips and sonar transmitters wired to tracking systems under the pavement. Aided by signals from the milepost markers that lined the roadside, the road shouted "this way!" to the receivers in the SMART car so the internal programs could manipulate the axles. The SMART cars did their part, bouncing radar and sonar off their surroundings, picking up signals from the mile markers and feeding the map of the world into collision avoidance programs that worked the brakes and pulled the steering wheel with more precision than a person could ever manage. On a SMART road, a SMART car could drive itself. More than that, anywhere it went, a SMART car could prevent an accident by refining the actions of the human driver.

Trish let out a sigh and punched the AUTO key by her right forearm. The blue dashboard light went green and she shoved the steering wheel into the rest position.

She keyed up the local map on the terminal above the stereo and hit the presets to lay down a route that would take her home. The path picked itself out in emerald on the map, showing that her chosen route was clear of both accidents and construction. Trish touched the confirm button while she groped for the catch under her seat that let her slide all the way to the back.

Where there would have been a back seat in a less customized sedan, she had a work area with a desktop, phone, fax, and mini-grid terminal.

The discount that let her buy this car was one of the perks of her job.

One of the few, these days. Trish swiveled the chair so she could stretch her legs under the desk. She switched the overhead light on and frowned at the stack of printouts dominating the little work area.

The development of the SMART program had been a ten-year source of sleep deprivation for Trish. She'd entrenched herself in a company with a lot of resources and a lot of interest in making the project work. With her development team hovering over her shoulders, her hands laid the first SMART road markers. She sweated bullets as she became the first to let go of the wheel and let car and road take over.

The broken collarbone she got in the crash that followed still gave her a twinge occasionally. It didn't stop her from trying again.

That second time, the team was able to drink the champagne they bought. Keeping the road temperature controlled added about twenty million to the cost of converting over, but it eliminated the problem of the delicate connections balking at sudden changes of temperature in uncertain climates.

Soon, SMART roads crisscrossed the

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entire US. Trish and her team were hailed as heroes of the modern age. No one hit so much as a squirrel for four years. Trish retired to the job of troubleshooter, where she spent a lot of days doing nothing and loving it.

Then, the first accident report appeared on her terminal. A fender bender on Old Main, one of the first sections of road to be laid with the scanners that made the road SMART. Accidents on SMART roads, no matter how small, were major disasters. Trish didn't need any reminders from her bosses about how fast investigations had to be conducted.

She'd been able to put it down as operator error. Both drivers had tried to override the SMART programs instead of letting road and car do their jobs.

They were just lucky, she told the papers, they hadn't been able to interfere too much.

Two days later, the fender bender became a four-car pileup, no injuries. Then, six cars, with contusions and abrasions. Then, twenty-five cars at rush hour, with broken bones and one concussion.

Trish started to hesitate before going into work, afraid of what she'd find out next. A car smashed into a median barrier. A pair of station wagons dove off a SMART bridge. Six people drowned. Two of them babies.

Now this. On top of questions being raised in the legislature and the veiled threats from the board of directors, and the fact that she couldn't plug in her home phone, her car phone or her private fax machines without undamming a stream of junk from reporters.

Some drunk ran him off the road, Davis said. Blind! The moron is blind! Trish felt her forehead draw in on itself.

Something had gone monstrously wrong with all the life-saving technology she had helped create. People were dying. People were still dying.

Trish shook herself hard and glanced back at the dashboard clock. Only 12:45 on January 27. It felt like it should be nearly dawn. She shoved the seat forward and keyed for a course change to take her downtown by way of an all night Szechuan restaurant.

A loaded paper bag in each arm, she rang the doorbell on a grey brick building where light still poured out of the upper story windows.

"C'mon up, Trish," rattled the voice from the intercom. "It's open." She wrestled with the door handle for a moment and then trotted up the narrow stairs.

She pushed open the door at the top. Light, warmth, and the sound of the London Symphony engulfed her.

The apartment was a single room that took up the entire floor of the building. Except for a tiny bed/living space at one end, it was a cross between a laboratory and a disaster area. Circuit boards lay on long tables beside bundles of colored wires and delicate solders, computer boards in assorted states of disembowelment, boxes of disks, stacks of books, and scattered paper.

"Hello, Scott." She set the bags down in a relatively clear spot on one of the tables. "I brought dinner."

"You brought a bribe," said the fair-haired, fine-boned owner of the chaos, delving into one of the bags. He brought out a carton and inhaled its aroma with the appreciation of a true connoisseur.

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"You know," Scott contemplated the box. "We could have an all-out nuclear war, have civilization rebuilt from the ground up by the cockroaches, and Chinese food would still come in these little white cartons. Let me get the chopsticks."

"How's Charlie?" Trish asked as she unpacked the rest of the food and piled the packets of soy sauce beside them.

"Not bad, not bad at all." He tossed her a pair of chopsticks, and started piling rice onto the princess chicken. "He'll understand me in strings of up to three words now." Scott plopped himself back into the easy chair in front of the one complete computer terminal in the place and beamed at it affectionately.

"You mean I can say hello to him?"

"I said he understands *me*." Scott tapped his chest with the clean end of a chopstick. "My voice inflections and patterns, and only up to three words. I'm hoping to get him up to six by next year."

"Well, say hi to him for me then." Trish perched on the edge of the table and dug her chopsticks into the Hunan beef.

"I'll do that," Scott mumbled around his mouthful. "So. What took you so long to get here? I've been hearing the accident reports for two months."

"I thought we'd find the answer." She stirred the beef and sauce restlessly. "We've been running every diagnostic we've got, plus a few we've just invented. We've been ripping up the streets and going over the connections with everything but an electron microscope. For a while there, I thought we had it," she stared at the black windows, watching her watery reflection stare back. "We found a couple of glitches in the lane tracking signals. We fixed them, and the accidents started to lighten up. Even went right back down to zero for a few days. Then . . . then they shot back up again. And they're getting worse."

"But you don't think it's just the SMART roads anymore," Scott prompted her. "Why?"

She described the scene on the dirt road. Then she took a deep breath.

"I think the car chased him into the creek and went down after him."

"Chased?" Scott repeated incredulously. "Come on, Trish! The guidance programs in the cars are designed to avoid moving objects!"

"You think I don't know that?" she shot back. "But there was only one set of tire tracks. They came down the road, and back up only as far as the accident site. The footprints were under the tire tracks, so was a scuffed up mess where the guy must have jumped out of the car.

"What if he'd been driving home and the car started to swerve? He tried to steer, but the car fought him. He tried to stop, but the brakes wouldn't respond. He panicked. Instead of shutting off the engine, he jumped clear. The car tracked his movements. It came after him, chased him right down into the creek. What if a man is dead because half a ton of metal, silicon, and plastic went insane!"

"OK, Trish, OK," Scott held up his hand. "I believe you."

"Don't humor me!" she slammed the carton down on the table.

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"I'm not. The one thing I'd never doubt you on is an investigation. But, Trish, you're getting irrational. Whatever's going on, it's not your fault."

"Keep talking like my psychologist and I'll throttle you." She ran both hands through her hair. After a moment she muttered "I'm sorry, Scott."

He shrugged. "'Sokay. If you can't holler at your friends, what's the good of having them around?"

"It's getting bad. They're having accidents all over. The know-nothings in the legislature are calling for the SMART roads to be shut down and for the engineers to be brought up on charges of criminal negligence and manslaughter. They want to take us back to the good old days. When there were hundreds of deaths, hundreds a *day* because human reflex couldn't react fast enough to a change in conditions."

"Like an oil slick on a wet road?" he asked quietly.

"Yes, like that." Her fists knotted up. "I know. I'm obsessing, and I'm raving. It doesn't change the facts, Scott. If we don't find out what's causing this, they'll get their way."

"I know." He fished another piece of chicken out of the carton. "You should hear what some of those committees are saying about Charlie's relatives," he jerked his chin at the artificial intelligence's terminal. "And they're not even in widespread use yet."

"So what do you think?" she leaned forward. "You can't tell me that you haven't had Charlie raiding my files for weeks."

Scott grinned. "I knew you wouldn't mind. Charlie," Scott clearly enunciated the name. The red power-on lights on the terminal blinked and the screen flashed from black to electric blue. Trish hopped down from the table so she could read over Scott's shoulder.

HI BOSS was printed in gold letters on the screen. WHAT'S UP?

"Recall. Crash records." He clipped off each word as he spoke it.

GOT 'EM.

"Add input." Scott's fingers flew across the keyboard, typing in Trish's description of the latest accident. He hit the entry key and Charlie's screen said

GOT IT.

"Set record conversation. Go."

SPYING, BOSS.

"Categorize common denominators. For all cars."

WORKING.

"Can he whistle while he works?" asked Trish.

"If I want to take six months off, spend a couple thou on the hardware, and a few hundred more on the aspirin for the headaches the program'll give me, yeah sure."

Trish barely had time to smile at his dry tone when the cursor began to speed across Charlie's screen, leaving behind it a neat column of subject headings.

MILEAGE, CONSTRUCTION, REPAIR HISTORY, POINT OF ORIGIN FOR PARTS . . .

"Point of origin for parts?" Trish all but jumped. "Charlie, elaborate on that!"

Scott shook his head. "You're anthropomorphizing, Trish. Charlie. List items. Category four."

OK BOSS.

"Well, looky." Trish leaned forward as the display scrolled up the screen. "The chips in the collision avoidance systems all came from Datanet, Inc.

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Thanks Charlie," her voice dripped sarcasm. "That really narrows it down."

"They supply a lot of chips?"

"Their nickname in Detroit is 'Chips R Us.' "

"Uh-huh," Scott leaned back and tapped his chin. "Are the chips for the collision avoidance programs preprogrammed?"

Trish nodded. "Mostly. The details are filled in by the car makers, depending on which model they're being put in."

"Could be a virus is being introduced at the factory programming level."

"Can't be. There have been a lot of accidents, but not *that* many. Plus, the car makers run diagnostics to make sure that the only programs in the chips are what's supposed to be there."

"Uh-huh," said Scott again. "But would you say it's reasonable we're looking for a computer fault, not a mechanical one?"

"Well, the computers are what's new. So's the problem."

"Right. Charlie. List items. Category three."

"Repair history?" Trish sucked on her lower lip. "We've been keeping up on that. None of the cars involved have gone in for computer problems."

"No, but," he scanned the list Charlie displayed, "they all were recently in for their 30,000 mile check-up. Doesn't that include a rundown of the chips and programs? And wouldn't Datanet be supplying those diagnostics, and maybe the equipment?"

"A virus introduced by the diagnostic program?" Trish's brow furrowed. "I suppose it's possible, but the timing's all wrong. And the fault isn't consistent. We've gone from dents to fatalities and back again."

"We're missing something, that's obvious," Scott leaned back. They sat silently contemplating the screen. Behind them the stereo poured out melodious strains of Beethoven. Trish suddenly realized it had been thirty-six hours since she had had any sleep.

"How long can you stave off the bosses and know-nothings out there?" asked Scott, looking up at her.

"Not long. As soon as the county announces the fault can't be in the roads, the car makers will have to shift gears with their accusations, but they won't back down. Tomorrow I'll probably have enough time to talk to my people and clean out my hard drive before I get the boot."

"OK. Tell your crew you've called in an outside specialist or something. I'll get Charlie factor crunching. There's got to be a pattern. When they pitch you out, bring 'em all over here and we'll huddle."

"Thanks, Scott." She smiled tiredly and stretched until she heard the muscles in her shoulders creak. "Keep the leftovers." She started to button her coat.

"Trish?"

"Hmmm?" she picked up her gloves.

"This isn't any of my business, I know, but," he looked up at her with a softly curious expression. "Were you and Dee in love?"

"Funny you should ask. We were discussing that when I hit the oil slick." She walked out the door into the winter night without looking back.

Trish climbed into her car and started

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the engine. She sat there for a moment, staring at snow fluttering into pools of street light.

"Home James," she said as she touched the preset key. "And don't spare the horses." Her car pulled itself gently away from the curb. Trish wrapped her arms around herself and stayed like that.

The next day, she stormed into the office, late and cranky. The three members of her core team waited in her tidy office. Atkins stood with his shoulders squared and his arms crossed. Singh leaned against the wall, and Lewis drummed her fingers unevenly on Trish's desk top. All of them held coffee cups and all of them looked up expectantly at her.

"The first one who says 'at least it's not the roads' buys it," Trish said firmly. "We're in very hot water."

"Like we don't know that," drawled Atkins. "Shut up and drink your coffee so we can tell you what we've been doing all night."

"Then maybe you can return the favor." Lewis smiled with one corner of her mouth.

"Yes 'm." Trish took the mug Atkins held out and sat down.

As it turned out, the night's post mortems on chips and programs from the disaster sites had reinforced everybody's worst fears. It was a virus, her team confirmed. It rewrote the guidance programs, reversing the responses to signals indicating the presence of stationary or moving objects.

As to how it worked, Atkins shrugged. Anybody's guess.

"The bloody bastard who designed it found a way to make it suicide," said Singh. "It wrecks the collision code and then rewrites itself. What we got is a heap of nonsense followed by the self-destruct code. Very pretty, but not very helpful."

The news had come in from Davis about the accident and, of course, the upper echelon had already issued loud, forceful, regretful press statements laying all the blame on the car makers. A friend inside what had suddenly become the other side, said the Big Four were busy organizing counter-statements that laid all the blame on the original engineers of the SMART program for not giving them enough factors to program the collision avoidance systems adequately.

"I passed Our Leader Mr. Delaporte this morning," finished Singh. "He had a gleam in his eye I didn't like."

"Shove the rats off the sinking ship?" suggested Atkins.

"More like send the lambs to the slaughter." Lewis rolled her eyes.

"We got anything besides a pity party going here?" inquired Trish frostily.

"Only second-hand bootlegs of the current car makers' reports." Atkins sighed. "Seems they are not supposed to talk to us anymore. No matter who finds the answer, Lewis is right. We're being set up as targets for the blame."

"Then we'll just have to find the answer first and be very vocal about it." Trish took a long swallow of coffee, letting the heat run through her. "I've called us in a ringer and he's at work on the problem. You do all realize we're about to be suspended?"

"I was wondering if you'd seen the

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signs," said Lewis.

"You mean this E-mail message on my screen that says the vice-president in charge of service, Our Leader Mr. Delaporte wants to see me? Yes, I saw it. I'll try and buy you enough time to get your hard drives dumped onto disk. Class dismissed."

They murmured their good-byes and separated.

The meeting in the leather and mahogany office went as badly as Trish expected. Delaporte stripped all the veils off the threats. Trish took her stance from blustering, to feeble protest, to meek acceptance in calculated stages.

When she returned to her desk, the yards of fax reports trailing across her floor nearly snatched all her self-control. The local death toll from last night was at 416, and mounting. Several personal letters from the other SMART trouble-shooters described the scenes. People crushed. People burned. People drowned. Papers screaming, voters screaming, politicans screaming.

The whole world screaming at her. Trish closed her eyes and saw the crumpled wreck in the icy water. Then, in a memory that time refused to cloud, she saw the paramedic's face as he slit the seatbelt holding her in the driver's seat. He told her Dee was all right, but the jagged hole in the windshield told her he lied.

She opened her eyes and looked back down at the reports. By the time the suspension notice came over the E-mail network, she had copies of them in her briefcase, and all her personal files about the accidents on disk and stowed in her purse.

She pulled on her hat and coat while she walked out. Her team met her in the hall and they fell in stride with each other.

"You were saying something about a ringer?" murmured Lewis as they trooped down the main stairs.

"Yeah. He's already invited us to congregate at his place. Atkins, did you get a chance to dump your drive?"

He patted his pocket. "Fortunately we're a shade faster than management."

Scott's place was in even worse shape than usual when the SMART team arrived. Trish performed the introductions between her skeptical co-workers and her obviously wrung-out friend.

"So what have you got for us?" she took up her spot on the table's edge. The others found places to sit or lean with some difficulty.

"A whole lot of nothing." Scott shook his head. "Yet. The virus is a bright one, that's for sure. Charlie. Display crash graph."

A tidy graph with a graceful double scarlet curve appeared on Charlie's screen. "That's the pattern of the severity of the crashes," he said.

Singh bent forward to study it. "Follows a monthly cycle."

Atkins shook his head. "No it doesn't. I could've told you that. Look," he tapped the curves for December. "Shot right back up at the end of the month, and went down all the way through January. Doesn't peak out again until last night." He fished the disks out of his pocket and tossed them on the desk. "There's my records. You're welcome to them."

"Already seen 'em." Scott grinned

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at the shocked look on Atkins's face and touched the side of his nose.

"What I want to know is where the hell this virus came from?" said Lewis. "Who could benefit if the SMART roads go down?"

"The ambulance drivers," muttered Singh.

"Sherlock Lewis's got a point." Atkins rubbed his knobby fingers together. "Who benefits from this? Not SMART Co. Not the car makers. Not the cities."

"Not the steel makers, certainly not the chip makers," put in Lewis.

"Stop!" Trish slammed her hand against the table top. "Not the chip makers. Screw that. Not Datanet, you mean. They'll go down in flames with us. The competition gets to rush in and fill the vacuum! If one company knew what was going on and was ready for it. . . ."

Atkins whistled. "They'd need an insider at Datanet, but it's not impossible."

"Now I remember why I left corporate work." Scott folded his arms. "OK. We still need to know exactly what's happening or people are gonna keep dying while you're all twiddling your thumbs in maximum security."

"You seem to know what we've got," Atkins cocked his eyebrows at Scott. "What've you got?"

"I'll show you. Charlie. Playback. Wednesday night." As the lists and files played across the terminal, Scott and Trish's conversation rolled out of the stereo speakers complete with the *Moonlight Sonata* in the background. Trish tried not to squirm.

Scott yelped and shot up out of his chair.

"Charlie! Freeze!"

"What?" chorused the startled engineers.

"I'm such an idiot." He tore his old-fashioned wall calendar off its hook and flipped the page back. "Idiot!"

"What?" repeated Trish. "Stop being enigmatic and talk!"

"Where were you all during the neopagan movement!" Scott demanded. "Those crash peaks correspond to the full Moon! There were two in December!" He displayed the calendar page with the full circle marked on it. "A blue Moon."

"What do all the cars have in them besides Datanet chips?" Singh threw up his hands. "Clocks!"

Lewis shuddered. "And I was thinking it was a Trojan horse. It's a damn werewolf!"

"You got it," Scott tossed the calendar aside. "Somebody out there has a sick sense of humor."

"Completely sick." Once again, Trish saw the crumbled wreck in the icy stream in her memory. "But it doesn't help a whole lot."

"That's where you're wrong." Scott stabbed a finger at her. "It tells us what to look for. What do you know about werewolves? Come on."

Trish swallowed her temper. "The usual. You get bit by a werewolf, you become one when there's a full Moon."

"OK. There's our pattern. You have to get bit. The bite, in the case of our virus, is from the 30,000 mile diagnostic program. The virus waits in the cars and kicks into one level or another of a ready mode according to the date." He pushed at his bangs restlessly.

"That's still going to leave a lot of

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irregularities to explain." Singh ran his tongue over his lips. "If the date puts it into ready mode, what makes it active? We're still missing the moonlight to create the werewolf."

"Damn." Scott pounded his thigh with his fist. "I don't know enough about what makes the SMART hardware tick."

Atkins smiled. "I think we can help you there."

The session that followed consumed twelve hours and almost as many pots of coffee. Ideas shot back and forth only to be killed as soon as they were explained. Questions piled up higher than the fast food boxes.

Daylight went and came again almost without any of them noticing.

Finally, the factors required to make their postulated virus work were typed into Charlie's screen. Singh dug his knuckles into his eyes and yawned.

"It's a lovely theory. Who wants to test it?"

"I will," said Trish without hesitation.

"Trish . . . " cautioned Lewis, reaching out a hand.

"Yes, I'm taking this very personally." Trish pulled back and raised her eyes. "I have every right to."

No one said anything at all.

In the end, it was Scott who wrote and loaded the programs to reset the odometer in her car to thirty thousand and turn the clock and calendar back two days. Atkins brought his cordless phone from home so she would be able to call in as she set the experiment in motion. Lewis grumbled over the hypothesis without coming up with one alternative, and Singh chewed his fingernails.

Finally, they let Trish climb into her car. She resisted the urge to override the SMART start and gun the engine to get away from all the eyes watching her through the windows. Especially Scott's. The grim set of his face said he knew what she had made up her mind to really do.

The Yellow Pages in her computer pointed her to a garage that used Datanet-approved equipment. She had to wait in their dingy lobby most of the day before they got to her. Watching through the door as the mechanic plugged the tentacles of cables into her car's underbelly, she imagined the virus crawling up the fiberoptics and nestling itself inside to wait until she made her way down the SMART road.

Elegant, was the word Atkins had used.

"Let's just hope we can prove it." Lewis's worried voice echoed in Trish's mind as her car pulled itself out of the garage.

As always, it responded smoothly to the course she punched into it. Without hesitation, the axles swerved to pull the car into the left turn lane.

The moonlight to create the werewolf was the signals from the SMART road. When they called to the collision avoidance program, the slumbering virus woke up, and looked at the calendar to determine how much of the collision code to rewrite. The closer the date was to the full Moon, the worse the damage.

Seventy to seventy-five miles worth of signals in the city, Scott figured. Ninety in the country. Then, it struck.

Atkins estimated it would take five minutes to completely reverse the collision avoidance code.

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And then people died. Trish watched the neat suburban houses give way to empty hills fading in the twilight.

People had believed her when she said if they just relaxed and let go, her cars and her roads would take care of everything. Those people were dying.

She closed her eyes against the encroaching night and saw the ribbon of fax reports trailing over the grey carpeting. She saw the paramedic's face as he told her Dee was all right.

Unexpectedly, she saw Scott's eyes, but the image was pale against a background washed with blood.

The cordless phone was ringing. She flipped the hand set over and angrily ripped out the batteries.

Leave me alone, she thought as she stared at it. I know what I'm doing.

They had a theory that held the answer. They knew who, what, and why. But who'd listen to their theories now? Sure, Scott had the team's reasoning recorded on Charlie, but they were all in disgrace and suspended. The Big Four were busy writing eloquent dismissals of their competence and Delaporte was probably reinforcing them.

The only thing that would save the SMART project now was concrete evidence that the virus functioned exactly as the team predicted. That evidence had to be presented in a way that would force outsiders to pay attention.

The AUTO chime startled her out of her furious reverie. Automatically, she pulled the wheel to her and gripped it hard. She braced herself for the drag when the car left the SMART road and the control of the vehicle was all hers again.

Or, it would have been if it weren't for the fact that the machine that carried her had become a monster driven by a virus and moonlight and as far as it knew, the Moon was full.

If Scott and Atkins were right, she had three minutes left to swing onto the deserted dirt road where no one would get hurt but her. Three minutes to climb out onto the fresh snow, leaving the engine running.

Snow chilled her ankles and tickled her neck as it fell into her open coat. The hill rose up and hemmed her in while the creek chittered inanely underneath the even hum of her idling engine.

Trish took a deep breath, holding the frosty air inside. She pivoted slowly on her toes, and began to run.

Come on! This way!

She heard it behind her. The engine's hum became a throaty growl. Snow and gravel creaked under the wheels as they gathered momentum.

Trish ran into the darkness. Her shadow skimmed the unmarked snow in front of her in the headlights' glare. The growl changed its pitch as the monster shifted gears to deal with the slope.

Trish stumbled and sprinted on ahead of it. The freezing wind whipped around her legs and ears.

The monster gained on her. Twenty more feet and the road swerved. She wouldn't. She'd go straight down into the creek. She'd leave behind her one set of footprints and one set of tire tracks.

Prove it. Prove it. Even that moron Davis will be able to see that the car chased you right down into the creek.

Ten feet. Five. Deep breath.

"PATRICIA!"

An explosion of noise and light shat-

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tered the night. The world flipped over in a blur of grey and cold. Above her metal slammed into wood and earth, splintering, screeching, tearing and, finally, silencing.

She blinked up at the stars sparkling over her sore head.

Somebody swore and scrabbled towards her.

"Trish!"

Scott. With warm hands and curses, he hauled her upright.

"Trish! Trish, you idiot! Can you hear me!"

"Proof," she croaked inanely. "Proving the theory."

"I know," he said. "I know. But Trish, think, will you? Nobody's going to listen to your team if the head kills herself. Have the know-nothings got you so scared you're going to lie down and let them win?" He knotted his fingers in his bangs. "Or did you just get lazy behind that service rep desk and forget that no system works right forever?"

She shook her head. "It doesn't work. All I did was make things easy for some corporate murderer."

Scott flexed his hands like he wasn't sure whether to hold her or hit her.

"The SMART system does work, Trish. You did it. You know it. You've saved thousand of lives. So you've got this virus. You've found out how it works. Now you get rid of it, find the psycho responsible and nail him to the wall!

"And when the next disaster hits, you fix that, and maybe you catch the next one in time to prevent it.

"Trish, the problems are never going away. That's the way the universe is! All you can do is make it as hard as possible for them to get past you.

"I can't believe you want to leave your work to somebody else." He touched her shoulder. "Like I can't believe you don't know you did your penance for Dee's death a long, long time ago."

Trish stared at him without moving. Then, exhausted and stunned, she began to cry. Scott wrapped his arms around her, forcing her into a close embrace like she hadn't let herself know in years. He held on tight until her sobs for Dee and all the other victims, herself included, eased themselves and she could wipe her eyes.

"You were waiting for me."

"Be damned if I'm going to let my best friend kill herself." He gently lifted her to her feet.

"How did you know?"

"I know you." he told her quietly. "Very well. So. Let's get out of here."

"Yes let's," she agreed as he guided her back up to level ground. "I've got work to do. Think I'll start with telling Delaporte what he can do with this suspension crap." Over his shoulder she saw her car had plowed into the hillside. "Scott," she licked her dry lips. "What did you do?"

"Shot out the tires." He picked the rifle up off the ground. "Primitive. Violent. But it worked."

Trish felt herself smile slowly. "At least you didn't need silver bullets." ■

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Probability Zero

A LOGICAL ANSWER TO "WHERE IS EVERYBODY?"

Richard K. Lyon

THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

CHARLES ACHINSON, on behalf of himself and all others similarly situated,

Plaintiff,

-vs.-

Civil Action No. 21-0076
Filed Feb 29, 2061

TRUMP STAR SHUTTLE INC.

Defendant

MEMORANDUM OPINION

Now that it is too late, the facts of this complex case are painfully clear. In 2042 Dr. Francis Nelson Stein announced the invention of a matter/tachyon converter, a device which permitted faster than light travel. Initially

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his claim was widely rejected, but in 2046 his sensational photos of an alien civilization on the fourth planet of Alpha Centauri produced extreme public excitation. In response, the Trump Star Shuttle quickly began operation, carrying tourists to Alpha Centauri, Barnard's Star, and other points of interest throughout the galaxy. A period of confusion ensued in which many people voyaged to the stars despite the fact that none of the returning travelers could remember their trips. Feeling themselves the victims of a fraud, they organized the present lawsuit.

In the years while they were waiting for their suit to come to trial, however, some of the interstellar travelers remembered their trips. They saw vast and incredible wonders on a dozen worlds, but the natives had ignored them. If they walked down a street through throngs of weird creatures, every single one of the creatures accidentally happened to be looking the other way and failed to notice them.

This strange behavior was too much for one man, a Mr. Simon Ramspear, who vowed to get some attention even if he had to use violence. Before he could carry out this threat, however, he suffered a fatal heart attack . . . or, at least that is how the people with him now recall the event. When the star ship returned to Earth, however, Mr. Ramspear was in good health with no memory of any adverse event. While it would be interesting to hear how Mr. Ramspear now remembers his trip, this is impossible owing to his recent death.

To explain all this the plaintiffs offered the testimony of an expert witness, Professor Hans Barth, MIT. While the facts in evidence might seem strange, Professor Barth swore that they were only what one should expect. The theoretical studies which had shown that tachyons could exist had also shown that, because of the Uncertainty Principal, tachyons could not be used to communicate faster than light. What that meant practically was that even though tachyons travel at super-light speeds, random events prevent any message they carry from being faster than light.

Thus, Barth swore, it was only to be expected that travelers to the stars would find themselves invisible to the natives of the worlds they visited. Going to the stars and seeing wonders involved *traveling* faster than light. It's long been recognized that such travel is theoretically possible. Being seen by the natives would involve faster than light *communication*, a well established impossibility. For much the same reason it was impossible to remember the trip until well after one returned.

Attorneys for the defense claimed Barth's testimony was absurd, a theoretical speculation that totally violated common sense. If Barth was right, then there must be aliens here on Earth walk-

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ing unnoticed among us. Anyone we met without really noticing could be one of them.

The little man in the gray overcoat sitting at the back of the court room, for example. No one had paid him any heed. Therefore, if Barth were right, the man might be an alien.

This absurd suggestion produced widespread laughter, but no one bothered to turn and look at the man in the gray overcoat. The court did . . . or perhaps I should say I did.

The legalism of referring to myself as the court hardly seems appropriate to a personal disaster.

The "man" in gray had three eyes and tentacles. Hastily I ordered an adjournment for lunch. In moments, I and the alien were alone. He/she introduced themselves as "John/Jane Smith" in a very cultured voice. John/Jane, I discovered, had learned English by auditing classes at Oxford from 1769 to 1885.

As to why John/Jane Smith was here on Earth, he/she couldn't really be sure. Probably he/she was a mortality fugitive.

I had to ask to have that explained. John/Jane, whose home world was on the other side of the galaxy, had gotten on a ship for a trip to a sister world only ten light-months from home. His/her next memory was being on a different ship when it arrived in our Solar System. While there was no knowing what had happened the likelihood was that John/Jane had died on the sister world.

Since FTL communication is impossible, returning his/her body to the home world would spare John/Jane from this unpleasant knowledge—but only for ten months. Traveling to Earth, however, would postpone this beyond even the life span of his/her species.

While that might seem a horrible exile, John/Jane assured me that Earth's alien colony, mostly mortality fugitives, was large enough for John/Jane to have an active social life. Just how many aliens dwelt among us unseen, however, he/she couldn't say, since there were some aliens who couldn't notice John/Jane and presumably there were others he/she couldn't notice.

Abruptly it occurred to me to ask why I alone was able to see John/Jane. His/her three eyes filled with tears. Sadly John/Jane told me that the only people who could see him/her were those who could not communicate what they saw, very small children, the senile elderly and . . . those about to die.

Fortunately I've always made it a habit to forget cases once I decide them. Accordingly I—no, accordingly the court finds in favor of the plaintiffs, awards them damages in the amount of three hundred neo-dollars a piece, and orders all records of this case sealed permanently. ■

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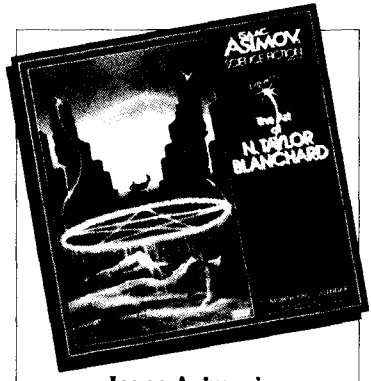

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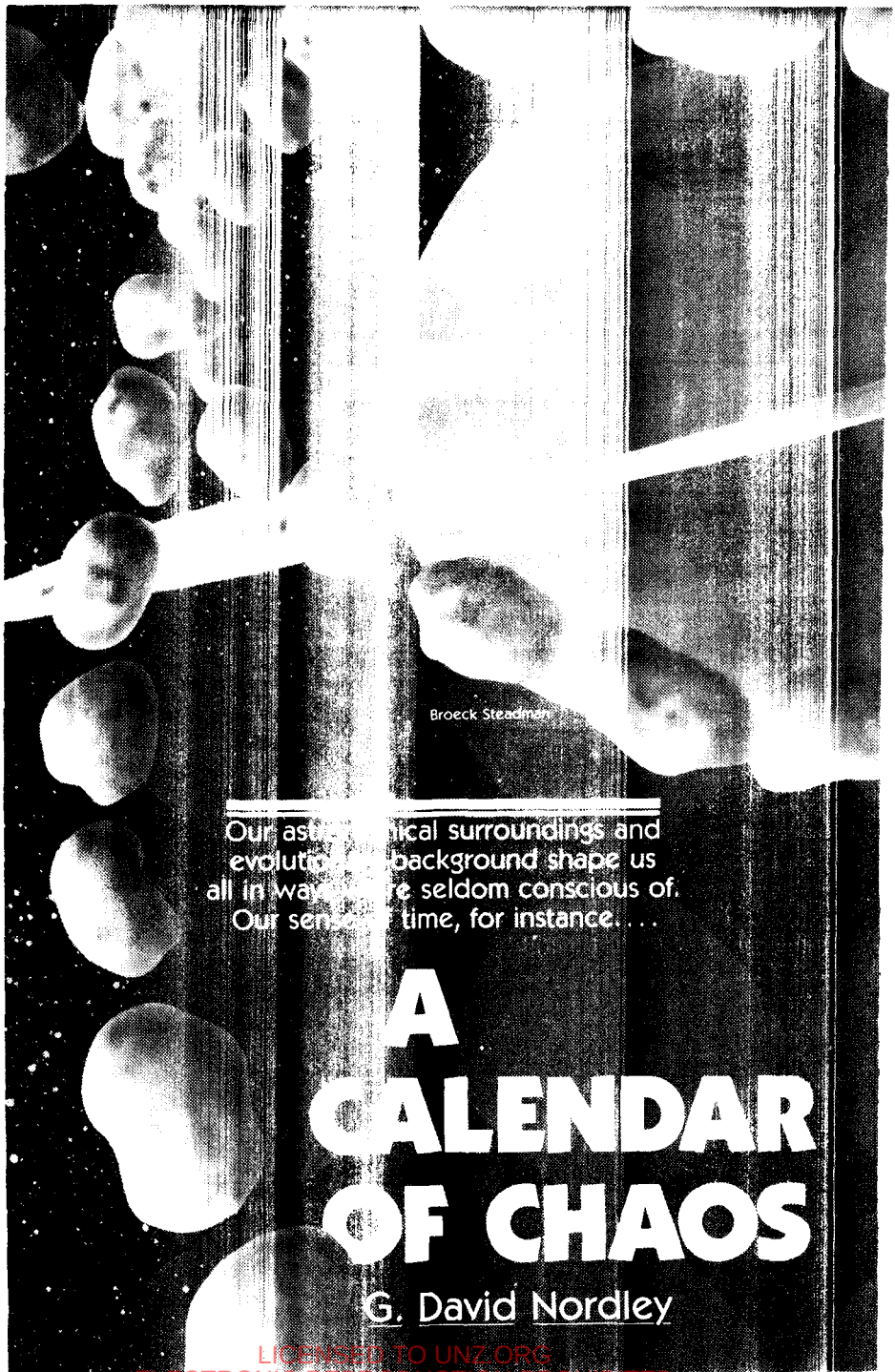

Our astronomical surroundings and evolutionary background shape us all in ways we are seldom conscious of. Our sense of time, for instance. . . .

A CALENDAR OF CHAOS

G. David Nordley

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I'm turning in my badge. Einstein was wrong, friends. Not only does God play dice with the Universe, the dice are loaded. And just when you think you've got the loading figured out, it changes. This can hurt, but it gives us opportunities. If you're smart you take them.

This unsolved murder on Saturn's moon, Hyperion, was one of those opportunities, and I took it. Usually, these things are an open and shut case of passion which they handle by sending the perpetrators back to the Cislunar Republic on the next liner. Like last year when a nerdette went overboard in a roleplaying game and killed her possessed boyfriend who had begged her to do it in a moment of lucidity; so she said, on record: closed. But this case wasn't so simple; there was no confession, and no clue.

Saturn system's heavy with Ph.D.s and light on people without self-discipline. No police as such; just public safety people and guards at sensitive places. No detectives, which is why they sent for someone. Things were slow at Coriolis Municipality, the place was overstaffed, and I was very single; my steady had just decided to marry someone else.

So I volunteered: Hartigan O'Reilly, have badge, will travel. One and a half billion kilometers seemed just the right distance to put between me and my romantic failures.

I had three months on the *Titania* to study the case records, not that it helped much. One stroke of luck—I met a slightly plump, bubbly, cheerful, very sharp blond doctor named Kris Kelly on her way back to Encke's Gap in the rings. She was half again my twenty-eight and very pragmatic about biological needs, so I felt pretty much healed when we finally patched conics with Saturn. To help fill the time, I brought her into the case as a medical expert. She helped me realize there was something wrong.

"Rigor mortis is temporary," Kris told me as she scanned my hard copy during a break in our recreation. "If the man died when they said, and the suit sealed and kept him warm, there's no way he could have been stiff when they found him."

"Could he have lived for a while with those wounds? The bullets were only twenty-twos." She shook her head, eyes glistening; even a doctor doesn't see this kind of thing often these days. I set the records aside, and we returned to less puzzling pursuits, affirming life in the face of death. I was sorry to watch Kris go on when *Titania* left me at Hyperion; it was my first experience with a woman who didn't want anything from me but my friendship.

Hyperion is a two hundred kilometer lopsided rock in an eccentric orbit just outside that of the giant satellite, Titan. But the orbit wasn't the only thing eccentric about Hyperion. Its claim to fame was the Chaos Institute, a sort of retreat for theoretical mathematicians concerned with the long-term behavior of hypersensitive systems.

The reason the institute is on Hyperion has immediate practical consequences: to reach its surface, you have to take a rocket shuttle. There's no tethertube sticking out into Saturn's potential well because Hyperion isn't tide locked; it doesn't keep one side to its primary like a normal satellite. Nor

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could you drop a tether down from a synchronous satellite. You see, a synchronous satellite requires a rotation period with which to synchronize, and Hyperion doesn't have one. Which is not to say that it just lies there dead in space; it doesn't. At least not all the time.

Ask the time of day from a Hyperionite, and you get this kind of odd, crazy, gleeful look, a bit of a laugh and a lecture in chaos mathematics. The word "day" implies a regular sunrise and sunset. But sometimes the sun stops overhead and goes back toward dawn. Or heads off at right angles. Is it noon when the sun is highest, or halfway in time between sunrise and the next sunset? Then, try asking about north.

To this environment, *designed* to test one's sanity, *designed* to strip away illusions of order in the Universe, add one loose killer.

Astrid Kholn, institute director and Nobel laureate in economics, met me in the entry lounge. I didn't recognize her at first because I expected an authority figure. The tiny, huge-eyed waif who welcomed me with a hug looked like anything but, though if I looked hard I could see the wrinkles in the corners of her eyes, and I could feel a purposeful confidence in that hug.

"Welcome to Hyperion, am I glad to see *you!*" She hadn't let go.

"You're making the feeling mutual, Doctor Kholn."

She chuckled and released me. "We're . . . spontaneous, open and creative here; you'll get used to it. It works."

I knew, Nobel prizes in chemistry, economics, and physics; thousands of software copyrights; all garnered in a dozen years by the little research community. Free thinking eggheads. But they were nervous eggheads. Someone had killed, they didn't know who or why, and he was still out there.

"This is our administrator, Jack Arabian." A tall ruddy man with a thatch of white hair shook my hand. We talked the requisite minutes about this and that, the human equivalent of canine rump sniffing. With that done, and a first name basis established all around, Astrid kissed me and went off to other business.

"I'll show you to your quarters," Jack offered.

We glided along through a passageway in 2 percent gravity, and emerged from a steep ramp next to the solar simulator in the center of a hundred meter clear dome sheltering the parklike residential compound. At its perimeter, low buildings whirled silently around on a maglev centrifuge track just below Hyperion's surface, tops pointing toward us, windows looking up. We walked through trees and grass to a clear, breezy, smooth area at the rim of the park. People sunning on rooftops waved as they glided by above. I noted that no one could approach this complex unobserved.

Around the edge of the grass and trees was a smooth surface that curved up like the rim of a velodrome, below or behind the circling buildings, depending on your perspective. It felt like plush carpet. As we walked up the rim we magically matched speed with the wind and the buildings while our centrifugal acceleration kept us feeling vertical. I raised an eyebrow to Jack.

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"Cilia," he answered. "Billions and billions of microscopic hands pushing your feet along faster than you can run."

I was back to lunar weight when we stepped off the carpet and onto the sidewalk by the landings of the residential compound. As we walked along, a tall skinny lady in a simple clingy shift with long straight black hair and Amerindian eyes came up to us, waved to Jack, and fixed me with a stare.

No introductions or small talk, she just came out with: "Remember, our metaphysics is a consequence of the complexity of natural law," and left us standing there. That was my introduction to Gwen Chryse, and I wasn't sure what to make of it.

Jack was amused. "She's one of our best programmers." That explained a lot, I guess. "She's really good at celestial mechanics, composes, and generally enjoys being different." There was a tone of whimsical tolerance to that which suggested Jack didn't mind.

I was assigned a ground floor suite with a three meter square general purpose room, a couple of minuscule rooms set up as office and bedroom, with a bath between them. I caught a whiff of cleaner. There was a small galley behind a wall panel in the main room. I found some ice water in the refrigerator, poured us each a glass, sat down on the simple frame couch, and went to work.

"Any new ideas on the motive?"

"Not much, except that the victim was working on closed form approximations of constrained secular chaos models, trying to come up with a more compact semianalytical algorithm for—"

"Wait a minute," I laughed, "you left me in the dust at 'closed form.' Do I need to know this?"

"Well, you asked about new ideas for motives, and the only thing I could come up with was professional jealousy. To work on that, you'll have to understand what people are doing, won't you?"

Indeed. I could see this new hand had a thing or two to learn, and, thinking back to my math grades, it was going to hurt. Don't ask me to mentally track tensor indices, avoid sign errors, or remember what equation 8-74 three pages ago was all about. If I could do that I wouldn't have been a cop!

Jack explained why Hyperion's orientation with respect to the rest of the Universe is a touchstone of applied chaos math. Its lopsided shape, its eccentric orbit, and the ever-changing tides of the other moons all lead to an irregular tumbling motion. Over very short intervals, its orientation could be predicted with very tiny errors by adding up its responses to every force separately. Take the new orientation, and you have a new configuration of forces to make another prediction. Repeat that again and again and you have the usual "numerical integration."

But those tiny errors multiply; the further ahead you predict, the more wrong you are and the problem is so sensitive that changing a number in the tenth decimal place could change Hyperion's predicted orientation by 180 degrees. You want to know Hyperion local time a year from now? It takes forever with a big computer to get a wrong answer. *That* is chaos.

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A "closed form" solution would be a set of equations which represents some sort of pattern in the history of Hyperion's orientation, Jack explained. Put a given date into the equations and you'd get an orientation to match, without having to do all the numerical stuff.

Good luck. For starters, no one has ever come up with a set of general purpose closed form equations for the positions of *three* bodies, and Saturn has eighteen other satellites.

"Semianalytical" is a sort of a halfway approach; you can stack almost-right closed form predictions on top of each other, and this gets you to that inevitable wrong answer in orders of magnitude less time, with a lot of close-enough-for-government-work answers along the way. Around Hyperion, fast, semianalytical chaos-grinding software was held to be the key to cybernetic sapience, and to some, the gateway to the human soul as well. It's serious stuff, here.

When Jack finished, I had the basic vocabulary, and a very uncomfortable feeling. Cybersystems are a taken-for-granted part of the infrastructure of life; but they can be secretly manipulated.

"Jack, if professional jealousy is involved, whoever did it might also be a pretty good hacker, right?"

"Quite possibly. Why?"

"The system handles your communications. I'm thinking we'd better keep this investigation face to face as much as possible."

He thought a bit. "Agreed." He went to a panel, opened it, looked around a bit, then threw a switch. "That disconnects the ears. Now . . ."

What it all came down to was that the victim, Dr. Konolaka Intebe, was using advanced semianalytical methods on a long term Hyperion calendar, and, with one exception, he had been the most successful so far, though Gwen Chryse and a couple of others were close.

The exception was a Mike Barynal, whose routine had been accurate for two years now. But it had thirty thousand lines of code no one else, including the semi-sentient system, could follow.

"It might seem," Jack continued, "that Intebe was jealous of the others, not the reverse. Intebe was suspicious, skeptical, and a loner. Gwen abhors jealousy, and Mike is the most effusive, outgoing, sympathetic person you'd ever want to know. In fact, no one suspected him of having real talent until he did his calendar. A lot of us think he just got lucky and doesn't really understand it himself. But Intebe was really bothered by something."

A redheaded woman in denim culottes, moving nicely under a loose shirt, stopped by and saw Jack for a moment outside. She looked a bit sad, then gave me a quick smile, and it was lust at first sight. But she left before I could think of a clever way to get her name.

Jack noticed my reaction and smiled, "Alindia Lindell, one of Intebe's few friends. She's been analyzing Barynal's prediction statistics." He shook his head. "Nothing new in the residuals."

"Oh. Ah, I can see I'm going to need a programmer or a mathematician to help me."

"Well, the first woman you met, Gwen Chryse, is both, and she lives just two floors above you. But as I said, she has a unique outlook on life. And Astrid

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isn't sure she shouldn't be a suspect."

I looked sharply at Jack.

He gave me a rueful smile and shrugged. "I think that's because Gwen's a determined eccentric. For instance, in this land of Ph.Ds, she's almost all self-educated and doesn't believe in credentials." He looked at me. "Are you ready for chaos, personified?"

My first visit to Ms. Chaos Personified was memorable. Space culture has been relaxed about clothes from the early days when swimsuits and pajamas were excess mass, but Gwen Chryse took this to its logical limit. She came to her open door wearing only an inductive neural interface coronet, nodded gravely to me as if this were perfectly normal, and sat down in the center of her super plush carpet in her totally unfurnished room without a word, leaving me standing there tongue-tied. Almost anorexically thin, she seemed to glow with inner tension or energy. In mild shock, I closed the door and collapsed myself to the soft floor beside her.

She smiled warmly then. "Listen."

I heard music, a solo flute. It played simple melodies, except that melody, key, and meter all evolved with nothing like a central theme, except perhaps, a mood. Like Webern, but tonal. Sort of. My ex had liked Webern.

"It's my way of loving God."

The music? The nudity? The empty room? I took refuge in business.

"As you know, Ms. Chryse, Dr. Intebe was killed three months ago. The crime is still unsolved and I've been brought in from Luna to investigate."

That got me another grave nod, and a look of interest and concern.

"Jack Arabian thinks it might involve some kind of professional jealousy concerning a Hyperion calendar," I added. "He thought you could help me understand what's going on."

"Oh." Gwen shrugged and gestured to one of the blank walls. Three identical holograms of Hyperion, centered on its largest crater, jumped out at us and started tumbling madly, like the wheels of a slot machine. When they stopped, they showed three different views, the first again centered on the crater, the second with the crater still in view toward the top of the image, and the third with a completely different view of the satellite.

"Six months," she said, "On the left is the system data base, the middle is Kono Intebe's simulation, and the last my own best," she shook her head, sending waves of ebony over her shoulders. "Mine's actually three rotations off, but the closed form part of my semi-analytical integrator is more powerful; it only takes a tenth the processor time of Kono's code. However, Kono's has more accuracy. I helped him." How? I wondered.

She turned and stared at me. "Do you trust me?"

Out of the blue; Jack had warned me. "I don't know yet."

"That's fair. When you trust me, join me. Much less tension that way." Her eyes, so deep brown they were almost as black as her hair, bore into me unblinking, and for a moment I felt obscene to be dressed. The feeling passed.

At last she sort of tipped her head to the side with a wry smile, flowed up, and offered her hand to me. I took it

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and scrambled up, all knees and elbows. She led me out, and stroked my cheek gently with her hand by way of parting. After a few steps, I looked back. She had gone back in, leaving her door open.

It was dark as I walked down to my flat, and I almost bumped into a large, effusive, black bearded man waving a notebook.

"Hi, buddy. You must be the cop they brought in from Luna. I'm Mike Barynal. How's the witch?" He tossed his head toward the upper floor. No puzzle as to whom he meant, but he said it with a smile.

"Hart O'Reilly." We shook hands. "My first impression is that she's a minimalist."

"Ha! That's appearances. She's got to be the most complicated, catastrophic, chaotic phenomenon on this rock. Damn good mathematician, though. Any interest in joining the six-month sunrise pool? One dollar."

Where else would sunrise be the subject of a wager? "I could only guess, but from what I hear, you have the problem solved."

"Yeah, that program is my baby," he beamed. "They won't even let me play the pool anymore; that's why I run it. Wanta bet?"

"What do I do? Just pick a time?"

"And a date and a place around six months from now." Of course. "Umm, since you're new I'll tell you the predictions are clustered around twenty-eight weeks and four days, with a standard deviation of three days. Closest one wins."

"There." I pointed overhead toward the most prominent peak I could see gliding over the rim across the park from the landing. "Three A.M. universal time, on a Tuesday in, let's say, thirty weeks."

I saw the redhead again, bouncing up the stairs while we were talking. To Gwen's place by any chance? Curiosity hit me.

"Astrid's peak on the twenty-third of November, you're on!" Barynal said. In response to my amazed look, he pointed to his headband. Another inductive neural link.

"Well, thanks," I excused myself, "I'll see you around."

There was no need to pry into Barynal now. With only vague suspicions, the last thing I wanted to do was worry him. That could come later. When he had gone I went up the stairs on the adjacent building to a place on the landing where I could see Gwen's door, and, in fact, well into her room. My redhead was there; Lindell apparently trusted Gwen, and they clearly enjoyed each other's company.

"This is where they . . . found Intebe," Astrid gestured toward a depression in the reddish, sun-darkened hydrocarbon gravel which covered most of Hyperion. Next to it stood a commercial telescope. "We think it was night when this happened, because Intebe was taking light curve readings on his variable stars, his hobby," she sighed. "He took a kangaroo to where it was dark on Hyperion when he needed observations."

We'd ridden out on a kangaroo: an actively stabilized platform with two ten-meter folding electromagnetic legs which leapt tall Hyperion hills in single bounds, barely restrained by the puny

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quarter-meter per second squared local gravity. A four-hour trip.

I looked for kangaroo tracks: a pair of long oval depressions. "Were there two sets of fresh leg prints nearby?" A fresh print would expose some unblackened dirt along its edge, making a light outline of the landing pad. Of course, *how* fresh would depend on the Hyperion calendar.

"At least," she laughed. "This area is antipodal to the Institute dome; we all use it to see the other side of the sky. Each picks a crater; there are a lot of them. Intebe's kangaroo returned on time, which is one of the reasons we didn't find him . . . his body for three days. They're supposed to be personally keyed, but a good hacker could have made it go back or have taken it back without changing registration."

Astrid turned to me, and I could see the lips pursed behind the visor of her helmet. "Most of us are mathematicians more than programmers; we work through the English language interface. I'm afraid there's only one programmer who's good enough . . . without an alibi." She meant Gwen.

"It doesn't strike me that professional jealousy would be much of a motive for Gwen Chryse," I said. "But she might have had other, less reasonable motives. She seems to have had, ah, emotional attachments to a good many people."

"I know. She's trying to be a. . . ." Astrid struggled longer than usual for a word here and the conversation stood still, like the tiny, brilliant sun just above the crimson-tinged plane before us. ". . . healer. Intebe's suspicions created discord, and she tries to use herself to alter and redirect that kind of emotional chaos. She's unfettered by conventional thinking.

"When her father was dying of untreatable nerve degeneration and when it got to be . . . hopeless, he took things into his own hands. We're pretty sure Gwen helped," Astrid's voice choked, "Gwen said, 'Death is the ultimate, irrevocable healing.' "

There was the kind of sadness in those fawn eyes and shaking head that just begged for an arm around the shoulder, impossible in vacuum gear. I put a pressure-suited hand on Astrid's shoulder, not much in a tactile sense, but maybe the thought would count. She put her glove over mine.

"You were close to her father?"

"Gwen tried to . . . heal me when he was gone. I know she meant well, but I didn't take it well. I'm very old fashioned about . . . preference." Astrid gave me an ironic, lopsided, smile. "And I kept thinking that he could have been with us another month or two, and that maybe something might come up."

The conflict was typical of the two women, I thought. Both intense and empathetic, the manager Astrid would stoically wait for solutions to emerge for problems while the visionary Gwen would passionately throw herself against them. Any cop will tell you that hierarchal position has nothing to do with leadership. Gwen was out in front. Astrid followed others.

"Gwen follows different rules," I noted. "Clothes, for instance."

Astrid laughed. "We have an agreement. She makes an extreme sacrifice when moving around in public, and no one complains about her open doors

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and rooftops. One wonders if she isn't simply reacting against her boyish figure. I think that shift is the only thing she owns besides her pressure suit."

"Could Gwen have ah, helped Kono Intebe die for some reason?"

"I'm not completely sure she wouldn't, in extreme circumstances. But have you uncovered anything that suggests Kono might have wanted that kind of help?"

I told her about Alindia Lindell and Gwen. I'd done my research, for more than personal reasons: Alindia, a brilliant statistician, had also been Intebe's lover.

Astrid nodded. "It's part of Gwen's healing, how she tries to set things right that chaos rends asunder. But I wonder; whose needs are the greater, Alindia's . . . or Gwen's?"

"Timing is everything," I said. "If that relationship had existed *before* the murder, we'd have to put a different construction on it."

"Perhaps." Coming from Astrid, that was strong disagreement.

I became conscious of an increase in light. The black shadows around us had paled and I turned to look out across the sanguine plain behind me. So slowly that it appeared frozen however long you stared at it, gibbous Saturn was rising. In airless vacuum, even as slowly as Hyperion sometimes turns, the difference between darkness and light can be but a minute.

It was easy to say that everyone else had an alibi, but it took two weeks of interviews, follow-up and double checking to support that. Finally, there was no more putting it off. Gwen.

It so happened that I passed Lindell again on her way down as I was going up the stairs to Gwen's. We exchanged nods. I sighed.

Gwen's room was filled with Bach, so my questions would have to wait. Obviously unarmed, she sat beside me, pressing her arm against mine, still glowing from whatever had transpired before I came. She could tell I liked Bach, and gave me that I-know-you look.

"Fractal music," she said when it was over, "a forest of notes from a little seed, all the leaves alike, decorating the structure below. Simultaneous sameness and difference." Then she gave me that intense stare again. It was how she held her head, I thought, or maybe that she didn't blink. "I was here when Kono died, most likely. Certainly in the dome. But you don't trust me yet."

"Did Kono trust you?"

She nodded. "Mike Barynal disturbed him; I tried to help."

How, Gwen? "Did the Lindell woman know that?"

She nodded and looked puzzled. "Of course." This time I stared at her. She dissolved in a warm throaty laughter and grabbed my hand. "I can be too arty, can't I? And this is very serious. Look, my relationships are very important to me, but they have to be inclusive, not exclusive. That's how I am, by my own choice. No one can own me, and I will not own anyone, not even when I feel like doing so. Everyone here knows that so no one feels threatened. Just trust me."

I kept my shirt on.

She picked the simple gray coronet up off the floor and put it on. She shut

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her eyes momentarily to concentrate, as many people do when sending subvocal commands to the cybernetic world. "Listen to this."

It was structured like the flute solo I heard earlier, except that it was grander, a full orchestra. It glided from key to key and featured occasional abrupt transitions of everything, but an ebbing and flowing pattern in the meter somehow stitched it together.

"Like Webern, sort of," I remarked.

"Sort of, but I keep the short-term infrastructure rigorously tonal. And I flow, resisting the temptation to shock all the time. That way, those catastrophic transitions I do have, have more emotional impact. In a way, Haydn is a better antecedent for me than Webern. The master wrote over a hundred symphonies, wrestling with form almost all his liife, before he finally won. Have you ever heard Haydn's oratorio *The Seasons*?"

I shook my head. The music changed. I thought I might be hearing Beethoven, or even Wagner.

"Great music owes its balance of form with emotion to Haydn's struggle, I think. I'm trying to keep the parts that resonate with emotion—meter, tone and melody—but play with the other things freely. If I do it right, it will be different but people will still like it instinctively anyway."

Well, maybe, I thought. She had a way to go. I'd learned my classical music by osmosis from my former girlfriend. The memories were still bittersweet. I tore myself away and got back to business. At least Gwen was in a conversational mood now. Or mode.

"You have a relationship with Alindia Lindell."

She closed her eyes, sighed and grinned. "Yes, oh, yes!"

Well, what did I expect. Evasion?

"Did you know what was bothering Konolaka Intebe?"

She nodded. "A relationship that is still troubling me more and more. Can I tell you about it, even if it is difficult, and even if you don't trust me?"

"Try me." I had the sort of rush you get when an investigation starts to get somewhere. When the real motives start to emerge, the nit and grit of human conflict: greed, jealousy, and passion. I leaned forward expectantly.

"What Mike Barynal's program does is too beautiful."

I had to remember then who was talking. By just about every standard in the civilized Solar System, this woman was a nut case. Sometimes it showed.

"Too beautiful. Uh, huh. Help me, Gwen. How can a computer program be too beautiful, and what does this have to do with Intebe's death?"

She gestured toward her holographic wall and we saw a rugged, bumpy, craggy, ovoid which could have been Hyperion again, minus craters. She closed her eyes and next to it appeared an egg, about the same size, with regular smooth patterns of ridges and valleys on its surface.

"Reality." She gestured to the rough egg. "Design." She gestured to the smooth patterned egg. "These are both residual surfaces. The differences between our predictions and the actual time history of Hyperion's motion are like the surfaces of those eggs. The bumps are time differences: hills for early, valleys for late. The surface is a

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map of the celestial sphere. For, instance, that bump at the top means my prediction of when the ecliptic pole would be closest to overhead was early."

Something like a plot of the wagers in the sunrise pool. "OK, I get it."

"My residual egg is rough, like a fractal surface, and Mike's is too regular, too smooth, too perfect to be real. Very beautiful, but not like nature. So you see that my problem is with the metaphysics, the relationships of physical relationships. The fit of Mike's projections should be a consequence of natural law, and I don't feel that it is."

"Like an alibi that's too good?" Was *that* what she was trying to tell me when we first met?

"Sure. Or like finding a passage of Bach on a white noise tape."

I saw it then. Who the hell ever remembers just what they were doing at 10:35 on a Tuesday three months ago?

"And Dr. Intebe saw this too?"

She nodded. "But he wouldn't discuss it until he was sure. He asked me not to say anything, too. I won't betray a confidence. But the cybersystem can, if you're on good enough terms with it, so to speak. And Intebe was spending a lot of time on this."

Barynal, if it was him, would certainly have been watching for something like that.

"Do you have a relationship with Barynal?"

"I tried, but it never got beyond simple sensual things. He was too insecure to give, and my trying to reach inside bored him."

I had to ask. When I'd run across behavior like Gwen's before, money was usually involved. With a start, I realized that I could probably ask her *that* question without giving the slightest offense. And at the same time I knew how ridiculous the idea was.

But what was significant was that Gwen had just cursed Barynal as much as she could: "too insecure to give." In her own crazy way, that statement must be the equivalent of a string of four letter epithets from here to the sun. Extreme insecurity has led to murder. I've seen it. And if once, again.

While I was in my own thoughts, her attention left me. She was staring at the eggs, in deep concentration. The eggs became another set of images. Both images gyrated. A page full of equations materialized between them. She looked almost catatonic, staring at all that. I squeezed her hand by way of saying good night and she squeezed back, not taking her eyes from the displays. I let myself out, closing the door to satisfy *my* sense of propriety—she could not have cared less.

And here I had been wondering how she got any work done.

As I walked down to my flat, I noticed that Barynal was on the landing of the building next to us, the same place from which I'd watched Gwen and Alindia Lindell. He couldn't see the holographic wall from there, and the rest had been pretty boring. Better luck with the next customer, buddy, I thought.

There were three or four more universal time days—the sun wobbled back and forth but didn't happen to set here during that period—while Jack and I conducted interviews and compiled data. It was a bit of a mind opener for him to see just how much data you end

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up with in hopes that a bit here will relate to a bit there. You worry innocent people, invade privacy, create enemies sometimes, and 99 percent of it is useless. But you don't know *which* 99 percent.

Gwen's sex life, if indeed that is what one should call it—at that point I began to think "healing" described things more accurately—was beginning to look totally irrelevant. What seemed relevant at the Chaos Institute was the general professional frustration with mathematical attempts to find some greater order in the drunkard's walk of the Universe.

The strong feelings of frustration, skepticism, and jealousy about anyone who claimed to have done so had far greater emotional reverberations in this community than any mere biological doings.

So if someone cheated. . . .

As a cop, this took me some time to comprehend, and lack of insight can be fatal. I had just turned in after another futile day, and lay awake thinking, watching stars roll by my window. It's funny how the mind can sometimes put things together while you're half asleep that it doesn't see when you're wide awake.

First, never mind the perfect alibi, I instinctively knew who the murderer was. He had cheated, somehow, and Intebe had been about to expose him and destroy everything that mattered on this world to him. If so, he had motive and his expertise gave him means.

Second, Gwen was a power programmer and analyst: if he was doing something underhanded with his program, she'd be one of the first to know, if anyone. She was a threat to him, just by being curious.

Third, he had been hanging around here, watching Gwen.

Fourth, I'd been up to Gwen's place twice, not for the usual reasons, and if he was as good a peeping Tom as I, he'd know that. He knew I was investigating, and would suspect Gwen of helping.

Fifth, if I was right, he'd already killed one person to cover up whatever the funny business with his program was.

And lastly, Gwen didn't lock doors —she seemed to think it was a cosmic affront of some sort.

The station kept universal time. However, on Hyperion, neither the mathematicians nor the sun honored that, so I suppose it wasn't too unusual for me to smile and nod to Mike Barynal, wearing his interface coronet, hand in pocket, on my way up to Gwen's at *two in the morning*. Out by Saturn, the sun is only a hundredth as bright as at Earth and Luna, but that's over five thousand times as bright as the full moon. It looks like daylight; he wasn't hidden.

He didn't look happy to see me, though, and I kept my hand on the compact neural sting in *my* pocket.

It never even occurred to me that Gwen wouldn't still be in front of her display, moons and equations flying. She was. Time to put on an act for Barynal's benefit. I left the door open and left my clothes where I could reach that discreet bulge in the right front pants pocket. Then I sat next to her, on the right side where I could see out the door, thigh to thigh in a way that let her know I was trusting her. I waited,

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watching moons spin, graphs form and dissolve, and equations roll from floor to ceiling for what must have been fifteen minutes—I could have been anyone, I thought crazily—before she acknowledged my existence.

The expression of surprise, joy, and perhaps triumph on her face was almost worth it. Without a word, we lay down on her super plush carpet, facing each other. She began touching me, stroking my arm. That should be enough to misdirect Barynal for just a bit, I hoped, enough to make him uncertain about Gwen's role with respect to me.

Uncertain enough not to try to kill us both right then.

I whispered in her ear, and her eyes grew wide. Then she closed them for a moment, and I saw the door, gently, soundlessly, glide shut. Telltales came on indicating a door lock and ears off.

Tension drained from me, and I lay limp on her floor, shaking my head. Then we started laughing, helplessly, insanely, the way you do when you hear a joke, or experience something so funny that you simply cannot stop, and if you do—the slightest little thing starts it all over again. When that finally wore itself out, I was exhausted.

Two pillows and a blanket appeared with a household motile, the first time I'd seen her use one of those funny stick men. We lay down, side by side, arms and thighs gently touching, and fell asleep. Gwen used bedrooms for storage closets. Out of sight, out of mind. Her life, I realized, had room for her math, her music, and her people; she allowed nothing else to clutter it.

Morning announced itself by means of the simulated sun lighting up her windows; I didn't think the real one would get high enough for a couple of days, but you lose track. We watched Saturn turn in her window and the tree tops drift by her skylight. We had some cereal and milk, showered together, and then completely untense and comfortable with each other, we did the natural thing. Gwen's crazy way, of course: on the floor in a bare room, lights on, fingers, lips, and eyes exploring, savoring and examining everything. Like many very thin women, she was intensity itself.

"Never, never, never do this without your mind," she said.

My what?

The next day I put in a call to Dr. Kris Kelly and reconfirmed everything we had discussed on board *Titania*, including normal relationships. It turned out that she knew one of the two institute physicians, and was effusive in his praise. She also had heard of Gwen from him and told me with a grin that, in her professional opinion, it was good for my health. I'd hoped she would have had more respect for my sanity. Was I that obvious?

I gave my report to Astrid and Jack. It lacked a smoking gun.

"So, the medics say Intebe was dead less than forty hours when he was found. We think it was local night where he was killed, because he was doing photometry with his telescope. But the database calendar says it was local day there when he most likely died, which means it was likely local night here and the man we *know* committed the murder was seen by several

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good witnesses here all that local night. We still don't know why Barynal's computer program is so perfect, but Gwen's working on it almost to the exclusion of everything else. No results. We're baffled and frustrated."

"I hope that's . . . an exaggeration." Astrid put her hand on my arm and looked at me with those fawn eyes and a wise smile. "I've a confession to make. I think I've come to trust Gwen, too . . . at arm's distance to be sure, but I can't see her killing anyone. Please understand that I couldn't just tell you that. I needed for you to reach that conclusion independently."

I shrugged, embarrassed. I felt more naked than at Gwen's.

"We have to face the possibility that we may never resolve this," Jack added, "and we'll need to keep a watch on Mike, on Gwen, on you, and perhaps on Astrid as well." Jack's the kind of person who wouldn't include himself on that list, but I added him mentally.

"Is there," Astrid asked, "any possibility that you might stay long enough to organize a security department for us? Or maybe even be part of it?"

Whoops, where did that come from? I regrouped. There was nothing to keep me on Luna anymore, though the idea of not going home again made me feel a bit homesick. However, the idea of leaving Gwen at this point wasn't any better. But, of course, Gwen's open lifestyle wasn't the sort of arrangement I wanted for the long term. And on the third hand . . . the director was waiting for me to say something, compelling me. What *was* it about women's eyes in this place?

"I'd like that, I think," I said. "But I need to get used to the idea. You're right about doing something for protecting people; why don't I call security at Saturn Station and see if they can spare somebody for a month or two?" That got me another hug.

The balconies that came with these suites were on the side of the buildings that looked up through the dome at the sky. So I'd had a little cantilevered balcony built on the other side, by my door landing, a place where I could watch people while I sat down with an iced tea and listened to Bach, or more and more those days, Chryse.

We'd been in a standoff with Barynal for a month now. He knew we suspected, but he'd had no opportunities and we'd had no evidence. Nervous smiles all the way around. So I wasn't completely surprised to see Jack walk down the stairs from Gwen's place, that afternoon. I'd just crashed from a day of tailing Barynal so I flagged Jack down and offered a chair and a drink.

Healing, Astrid had called it, and the wounds of tension were all over Jack. He was a practical man, a physicist and engineer moving in a land of people who thought logic was the basic building block of what mattered. He settled in, and with two sets of eyes watching, we relaxed a little. How long could we keep it up, I wondered, waiting for something to break, and afraid of what that something would be.

"How's Gwen?" I asked.

"Holding up pretty well. Thank goodness she'd already tried and failed to solve Mike her own way before this all came down."

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I could see Gwen in front of Barynal trying to stare a gun out of his hand, trying to exorcise his demons with love-making. I shivered.

"All this enforced privacy is wearing on her, though," Jack added.

I agreed. "Kind of like caging a bird. Or putting a leash on a butterfly." He laughed. My rap sheet says "cop," not poet.

"You love her, son?" With thirty years on me, Jack was entitled to be a bit paternal. I didn't mind.

I nodded; yes I loved her, not without reservations, but she'd overwhelmed those unworthy thoughts with whatever it was she had.

"I do too," he responded. "Thank God Astrid understands."

"Sure." For someone in Jack's position, the relationship was, in a word, delicate. But with Gwen's eccentric's license, all things were possible. "Jack, I've never shared anyone before. Of course Gwen would argue that word. She'd say you can't share what you don't have. She'd call it, the relationship, a . . . some mathematical term."

"A correlation matrix," he said. "Like a mileage chart on a map. Everyone coupled in some way with everyone else. Her idea is to create bonds between people, not own them. She sees so much pain around her, that she's trying to reprogram humanity into something, open, non-possessive, loving, and putting herself on the line to do it. I think she thinks if we're all correlated, maybe we'll stop hurting each other."

"Like if she can just plant the right cultural seed, a whole need pattern will emerge and everything will abruptly change."

"Fractals and chaos," Jack laughed. "You're catching on to this place. Well, I think it can be done, but . . ."

When you are merrily going crazy yourself, it gives you a good feeling to know that someone nearby has their feet on the ground. I was starting to lose that feeling. Uneasily, I waited for him to complete his thought.

". . . not her way. She's going uphill against human nature. For instance, I know I feel uncomfortable not being the only one in her affections, and I have to struggle against that feeling, as I'm sure you do. People run on hard-wired programs as much as software. To change people, those programs will have to change, too. But that kind of genetic engineering's going to have to be subtle, because, for instance, I wouldn't *want* to feel any less protective toward those I love."

"Yeah. I feel that insecurity too, but I can live with that. Just think of the alternatives. The dumb thing is I can't keep my mind off Alindia—I want Gwen all to myself, and I want her, too."

"Higamous, hogamous . . . we need some biologists around here, and some ethnologists." Jack shook his head. "There's so much that could be done to give people the option of feeling what they want to feel, rather than what the jungle programmed them to feel."

"Speaking of biology and heredity, what do you think of the way Gwen and Astrid stare at you? It's almost compelling for me. Like I'm being hypnotized. Is that some sort of mutation?"

Jack laughed at that. "It's worse for me because I've known them long

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enough to respect and maybe be a bit wary of the brains behind those eyes. You tend to give them the benefit of the doubt, and do things their way. These brilliant women are a bit addicting. I'm not sure if I'd know what to do around an airhead anymore."

"Yeah. Speaking of airheads, in three weeks I've got nothing much on Barynal. I don't even have probable cause for a gun search."

"I could issue a warrant; as administrator it's within my powers. And not just for the gun. We should do some legal hacking. If Mike's cheated on that program, he's done something that's almost as antisocial as murder around here. If he suspects we've got anything concrete on that, he'll be desperate enough to use the gun, or anything else he can get his hands on."

"But even if we found the gun and made an arrest, without probable cause, he'd go free in a week on appeal and no Republic court would accept the evidence. We need a longer term solution." What I said next was sheer frustration speaking. "Sometimes I think it would be very convenient for Barynal to have an accident." I'd never . . .

"I've had the same thought, son," Jack admitted. "But you know that would hurt Gwen as much as a Barynal bullet. Feels good to get that idea out, though. Just saying it helps let off steam. We can't keep this watching and waiting up forever." As he got up to go, he put his hand on my shoulder and squeezed. It felt so good, I wanted to cry. Damn, I was tense.

Gwen called me, a first. Her philosophy was that if she issued invitations, people would wait for them instead of just coming to her when they felt the need—and maybe they would wait too long. But this was an exception. A catastrophic change of state was about to emerge from a certain seed which she had been integrating.

"Sounds like fun," I said; "I could use a little correlation matrix element strengthening." I had the vocabulary down by now.

When I got there, she helped me get natural, I put the neural zapper where I thought I could get to it if Barynal showed up, and we enjoyed a long warm embrace. But I sensed it was even more intense than usual for her.

"Do you trust me?" she asked.

I spread my arms in bewilderment.

She laughed. "Really, really, trust. With your life? Seriously?"

She meant it. I consulted myself, then nodded. A blank check. I loved her so much I gave her a blank check. Idiot, I told myself.

"Alindia." At Gwen's call, Alindia Lindell emerged from one of Gwen's bedroom-storerooms, unattired as appropriate to Gwen's universe, and just a little hesitant.

I started going haywire inside, worried that the usual feelings I started having would mess up things with Gwen. I'd even avoided interviewing Alindia on that account, leaving the chore to Jack.

Gwen led her to me. Alindia tilted her head toward Gwen with a very nervous smile. I could sense Gwen's tension too. She was apprehensive, but determined as ever.

Yes, I knew Gwen was crazy, that I couldn't be her only one, and some-

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how that made all this OK. But I wanted to project normalcy on her, and this was very close to being too much for me.

Gwen put a familiar arm around each of us, and the comfort of that drained some of the nervousness away. "Trust me now, both of you. Believe me, it's right; it's beautiful, and it's what has to be."

"Gwen," I protested, "we don't know each other."

"Please. I know you both very well and I know you are right for each other. This is the start of something that's going to last and grow forever, a once in a lifetime experience you'll never regret. You've got to go for it." She was almost in tears now, pleading. "You've just got to. And take me with you. Both of you. I'll always be there, too."

We both embraced Gwen to comfort her, and in the process we embraced each other, the ice of our individual shells shattering.

"All right Gwen," Alindia whispered, "at least let's have your flute concerto, the happy one." Gwen smiled and music came.

Then, with Pan helping Cupid, slowly, carefully, laughing at our own nervousness, wanting to please Gwen more than ourselves, and with Gwen helping with touches and kisses every step of the way, we started.

And, somehow, it worked.

Afterward, Gwen served orange juice and cookies, and we chatted and partied like three kids. The openness was intoxicating and there were moments when I felt as if the differences between male and female faded away to insignificance. Our smells mingled without embarrassment. I happily betrayed all the secrets of my sex to Gwen and Alindia, they reciprocated, and we laughed so hard we cried.

"Gwen," Alindia said, serious now. "You're always saying how much more important my mind is than my body in loving."

"Sure," Gwen nodded, eyes sparkling, hair waving.

"Well, I need to share something with you two. I just won't feel complete without sharing this, like holding back when I have to give completely. You understand?" We nodded.

She put on Gwen's interface coronet and, in a few seconds Alindia's apartment materialized in front of us, seen through the eyes of her motile, a neat place of bright colored paintings and tons of books. It went to her bedroom and picked up a leather-bound handwritten diary and opened it, letting us read.

There was poetry. There were thoughts; some about us, some not so flattering: was I an unapproachable hard-ass? Did Gwen create barriers of eccentric behavior to *avoid* involvement? There were mundane experiences. Health problems. Philosophy. Intimate fantasies. We sampled, intrigued, amazed, sometimes embarrassed. I met a mind that was in ways like my own, but more free. The universe had rolled a seven and Gwen had seen the dice.

"OK," Alindia said at last, "Now that I'm really naked, can you guys handle it?"

"I'm overwhelmed. Yes!" Gwen looked at me, pleading.

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"OK here," I added, still cautious.

Alindia kissed me then, long, full and happy. Sure. Why not?

When I emerged I noticed something on the diary page that made my heart stop. Before each diary entry, Alindia had roughly noted the Hyperion local time, like this: *Tuesday, 3rd of June, sun high, Saturn rising.* I asked her to look for the page from the day of the murder. She had recorded it as daylight here at the Institute.

"Gwen, do you see that! The calendar database is wrong. It *has* to be wrong. Barynal's alibi is a lie."

"Oh!" Gwen let it sink in, changing gears with difficulty. After a minute or so, she asked: "Alindia, love, please let me have the crown." She put on the interface coronet, and in seconds the wall came alive with symbols and cursors overlaying the diary image.

I explained the calendar problem to Alindia in whispers while Gwen worked feverishly. She needed a warrant to access Mike's program. I called Jack and got it. Minutes passed into hours.

"It's a worm," she said at last. "His calendar program works because his worm steals our past and changes it to fit his theory, like some cybernetic Marxist. Look, I've used Alindia's diary data to make a good historical curve. Barynal's calendar program doesn't work at all. My program isn't any worse with the real data than the cooked data, but look at his real data correlation egg!"

In place of the rippled-surface egg we saw before, I saw something that looked like a porcupine.

"Here, I can show you with music. Listen to this. I'm going to use a copy of my *Sunsets* score as data and use his program to compare it to *Sheep May Safely Graze*. There, that's the residual surface. It's as flat as I am. Now, if we listen to my composition's file. . . ." We heard Bach instead of Gwen Chryse; beautiful yes, but not what had been there. "He got away with it because no one keeps paper records any more."

"The sunrise pool?" I asked.

"He's not in the sunrise pool," Gwen reminded me. Of course. "And the only records of his predictions—"

"Are in the system with all the orientation history data. Except mine," Alindia preened for a moment, then bit her lip. "But my raunchy diaries, they'd have to be evidence. I can see it now—they'll call me the wannabe Anais Nin of Hyperion."

Yes. A good defense lawyer would make the whole thing public, to try to discredit her. Jack was right; Alindia has very ordinary eyes, but what was behind them snared my soul. She looked at us. "Well, I guess I can take the heat if you guys stay with me, huh?"

"Alindia, you have guts enough to do that and you might have a hard time getting rid of me, ever." That just came out of me of its own volition, or maybe Gwen's, or maybe Alindia's if I thought about it. Completely crazy.

I knew a lot *about* Alindia, of course, but I'd known her personally, for less than six hours. But she came very highly recommended. I thought about arranged marriages back in old China. Astrid had told me this place was designed for creativity.

Alindia beamed me a "Yes!" and

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Gwen really let go then, sobbing. No wonder with the emotional risks she had taken, all the work on top of it, and with lives at stake. We held her until it stopped.

I suffered a little disconnect then, wondering what happened to the cop from Luna I was five weeks ago. What was I doing here? Was this me? My life seemed to be turning into part of someone's work of performance art. Not that I minded; the artist knew what she was about.

Fortunately, as it turned out, we were so giddy from all of this that we woke Jack up at 3: 00 A.M., universal time, to tell him what we'd discovered about the calendar and ourselves. He said he was really flattered that we trusted his good will toward us so much to ignore the clock for something so important, and he'd be over later. I guess that's one definition of a secure friendship.

Unfortunately, the night was not done. We decided that Alindia and I would go back to my place to let Gwen decompress for a bit. To do that, of course, we had to dress, unlock and open Gwen's door. In our happy, careless, openness we did things in the wrong order.

My brain had just started to tick. We knew Barynal was monitoring the Institute's system, no real problem for him, especially his own program which Gwen had hacked into and had been feeding all sorts of unusual things like Bach and the real Hyperion calendar.

I watched the door slide open. It was night in both ways outside, he was dressed in black, and all I saw before the flash was the pale part of his face above his beard.

Maybe he thought it would look like we did it to each other.

His first shot put Gwen down instantly. My gun was out of reach.

Alindia dove for Gwen's coronet, drawing a wild bullet. I didn't think the ricochet hit anyone; no yelps.

It was my turn.

I stood up and looked Mike in the eye, like Gwen would have done.

He looked at me, not wild eyed at all, just calm as could be.

"You really don't want to do this," I soothed, starting to walk slowly toward him, hand out. "There's really nothing to fear. We can help. We understand. And the secret's out anyway; there's nothing left to hide. We've already—"

"Sorry about this, buddy," he interrupted, "I can control the system, but with you I really don't have much choice."

I took his third bullet in the left lung. A kick and a bad sting. I thought I had a minute or so before the pain would be disabling, so I kept coming. This unsettled him, widening his eyes, opening his mouth. Just don't go for the head, buddy, I thought. I coughed a bit. "We don't hate you, we'll try to help," I told him, swallowing blood in my mouth. "All you have to do is trust me." I reached him and put my hand on his shoulder, ignoring the gun for the moment. He didn't expect this; the gun wasn't controlling me and he was losing it, trembling now.

"Let's sit down." The pain was really starting to kick in now and my lung was filling. Fortunately he sat. Maybe the situation was finally getting through to him. I put my hand on his gun hand until he relaxed, then I took the gun and

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flipped the safety on with my thumb. Target pistol. Gwen baby, you should survive this I thought, and hoped I would, too. I set it down as far from me as I could reach. I patted his hand. "We've got to stop meeting like this," was all I could come up with.

I risked a look at the women, losing eye contact.

Alindia was tending Gwen, her head on a pillow facing us, her eyes open, and she was wearing the coronet.

It was dumb of me to lose eye contact. Barynal tensed up again and lunged for the gun. I guess he realized I was hurt and thought he might still have some slim chance to save the crumbling edifice of his life. I couldn't stop him; I could hardly breathe, and the pain was incredible.

Then Alindia got up and walked toward the door, distracting him. But I couldn't do anything, couldn't even move toward my gun. She just stood there and looked at him as he leveled the gun at her. . . .

. . . and collapsed in spasms. A neural sting hit. But he still held the gun, fighting the disruption.

I looked around and saw Gwen's motile, a fractal stick man holding my gun. You weren't supposed to be able to get the system to make a motile do that, but Gwen had.

"You have to do it again, one shot won't hold him," I choked out.

Mike Barynal jerked again and puked. Then I saw Jack, in the door. They'd both shot.

Alindia rushed forward and took the twenty-two. No need.

I went in and out of consciousness after that. I think I remember Gwen going by on a stretcher and Jack holding my hand.

* * *

We're going to have to come up with something better than Gwenites, I thought, as we stood in vacuum suits on the red plain under the glowing rings of a crescent Saturn. Chronos to the Greeks, god of time, and symbology is important when you're starting; the history of this should be its own poetry, to be remembered forever.

Doc Kelly and her family came out for this; they might stay to join the genetic engineering project. I hoped so. Doc belongs here.

Somehow, some way, Jack's people are going to set aside three and a half billion years of homo sap's excess instinctual baggage; tone down the dominance seeking and possessiveness so subtly hidden in our genes and let us be what our minds tell us we want to be. But without losing the sweetness that makes being worthwhile.

In the meantime, there will be need for a cop; in the case of yours truly, one who's got a clear idea of where the species is going and why it's worth protecting. And I'll have one gutsy redhead there to help me do it. So, friends, I'm afraid I'm here to stay.

Gwen is here in a motile spacesuit, a temporary encumbrance, she assures us. They took the bullet away from her spine and she can already lift the little finger on her right hand, unassisted. With her skill in directing computers, the suit obeys her will almost as well as her body did.

Astrid and Gwen conduct the ceremony together. Astrid makes the dry formalities sound like a benediction while Alindia and I hold hands. Gwen says one word, a verb, not a noun. An imperative.

"Love." ■

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the reference library

By Tom Easton

The Host, Peter Emshwiller, Bantam, $4.50, 358 pp.
Soothsayer, Mike Resnick, Ace, $4.50, 288 pp.
The Kalif's War, John Dalmas, Baen Books, $4.95, 392 pp.
Blind Justice, S. N. Lewitt, Ace, $4.50, 265 pp.
Phantom Banjo, Elizabeth Scarborough, Bantam, $4.99, 264 pp.
Tales of the One-Eyed Crow: The Vulgmaster, Dennis McKiernan, graphics by Alex Nino, ROC, $3.50.
Fatal Exposure, Michael Tobias, Pocket Books, $4.95, 281 pp.
Anthology of Florida Science Fiction, Rick Wilber and Richard Mathews, eds., Pineapple Press (P.O. Drawer 16008, Sarasota, FL 34239), $12.95 (pb), 304 pp.
Nebula Awards 25, Michael Bishop, ed., Harcourt Brace Jovanovich, $24.95 (hb), $14.95 (pb), 304 pp.

The late Ed "Emsh" Emshwiller was a distinguished science fiction artist. His wife Carol is an SF writer. And now their son Peter—who has spent much of his time in the performing arts as an actor, filmmaker, special-effects technician, singer, lighting designer, and more—is one too.

That's not too surprising, you say? Maybe not, but many children of famous parents find the thought of competing on the same turf intimidating and look for something else to do. Perhaps that is what influenced Peter's earlier occupational choices, though those choices had also to reflect the artistic atmosphere in which he was raised. But now he's home again, and what he's been doing is influencing his current occupation.

You can see it pretty clearly in his first SF novel, **The Host.** The scene is the nation of Manhattan, in a USA fragmented into a United Countries of America. The city we know is divided into two levels, First and Second, the latter built upon a deck that slices across

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the city to exclude all buildings less than five stories high, open to the sun, occupied by the rich and powerful. The poor of the First Level dwell in darkness and damp, jobless, hopeless, even childless because their masters have put birth control drugs (prophies) in their food and water. And there are rumors of revolution from the golden land of California.

Enter Watly Caiper, recent arrival in Manhattan from the hinterlands of Brooklyn. His great dream is to be a mother (a parent; the language has changed a bit), somehow to gain the money to buy antiprophies and a license to reproduce and then to find a woman. But there are no jobs—except one. The technology of the time permits one to shift one's consciousness into another's body for 5-7 hours. The Second-Level rich use this technique to exploit the First-Level poor. "Donors" hire "hosts" to carry their minds on slumming expeditions. Since the donors are in total control, the hosts are seriously at risk. Donors take chances they wouldn't in their own bodies. Sometimes they destroy or even kill their hosts. But the pay is very good indeed, and there is never any shortage of volunteers.

So Watly becomes a host. He is on his way toward his dream. Alas, his second donor removes the unremovable cuff that marks a host as a host, produces false ID cards, rides him to Second Level, and there commits a most foul and despicable murder, right in front of surveillance cameras. "There you go, Watly, baby. And you're not wearing a cuff, so they think you did it. It's all yours. I'm outta here."

Watly is in some jam. All hope of becoming a mother is gone. Life itself seems horribly tenuous, for the cops are after him with orders to shoot to kill. But he is both ingenious and lucky. With the help and encouragement of the hosting center doctor he thinks he loves, he clings to window frames, climbs walls, spiders across the First Level ceiling, flies up the flue, discovers the underground, unravels the plot that nailed him, and finds justice of quite a poetic sort.

Most of the individual elements of Emshwiller's future—the Levels, the prophies, the hosting, and so on—we have seen before. But he handles them masterfully and with a sense of theater that seems both to emerge naturally from his background and to bode well for future dealings with Hollywood. This one could make a very good movie.

Consider a young girl, six or seven years old. Her name is Penelope, and she has the ability to see the futures just ahead of her. She can also see which of those futures is likely to be the best for her and which of her own actions can bring those preferred futures about. If she sneezes or breaks a window or spills a drink, for instance, a killer will, distracted, stumble and break his neck, and she will be safe.[1] She can also tell who will win a hand of poker or what number will come up next on a roulette wheel.

Not surprisingly, many people want this child. She has a power for which governments and gangsters and others will kill, or for which they will pay handsomely. Yet she does not wish to be a prisoner. She wants freedom, secu-

[1]Causation takes an admittedly weird turn here, yet we can perhaps grant that Penelope's actions need not "cause" but only be "coincident" with future events. That is, she peers into the future and sees that the future she wishes is the only one in which she drops a book right now, just so. So she drops the book. She is now on her foreseen future track and what she wishes will come to pass.

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rity, love. She wants what any child wants. She therefore also wants her own way, and she has the power to achieve it.

Is she a poor little tyke? Or is she a threat to the fabric of civilization? Or is she both? The tension between these alternatives is what drives Mike Resnick's **Soothsayer,** the first volume in a trilogy that will track what he tells us in his prologue will be Penelope's "short, turbulent life."

The universe is that of his *Santiago,* a galactic civilization peopled by larger-than-life bounty hunters, criminals, and other characters inspired by Earthly frontiers such as the American West and colonial Africa. As the tale opens, Merlin, an illusionist or stage magician, is putting on a show. When he locks his assistant, the Mouse, into an airtight box from which she must escape, the Mouse rummages through nearby living quarters as a thoroughly alibied burglar. On one such excursion, she finds a sobbing child manacled to an alien's bed. She rescues Penelope, and in due time she and Merlin learn just what talents the poor little tyke has and why large numbers of bounty hunters are pursuing her.

Under Penelope's guidance as to just what the "right" thing is to do, Merlin and the Mouse separate and the Mouse and the child acquire a protector in the person of the Forever Kid, an immortal gunman who craves defeat. They flee pursuit, first to an old friend of the Mouse's, the Iceman, and then to the grasp of an entrepreneurial pirate, the Yankee Clipper. Penelope's powers begin to mature, broaden, and strengthen, and the evidence mounts that those powers can indeed be threatening, especially to anyone who dares to defy the child's self-centered wishes. And then they meet the alien Mock Turtle, who believes that whatever little Penelope wants is right, by definition. They wind up on Killhaven, still hotly pursued by the bounty hunters, and there is a grand shootout that leaves. . . .

Who dies? Who lives? I shouldn't say, but with two more volumes coming up, you know that Penelope has to survive. She even has to wind up in what looks, at least for awhile, like security, safety, indulgence. And her powers are growing. Perhaps the second volume will show us a spoiled brat with absolute power, a terrifying vision indeed if that absolute power corrupts as absolutely as the adage has it. The third volume? Perhaps she will learn restraint. Perhaps, in an echo of the Forever Kid's yearning for destruction, she will pray for the failure of her powers and punishment or death. Perhaps she will prove a veritable demoness. But not an infallible one. Remember, Resnick has already told us that her life will be short, if turbulent.

Need I add that the tale bears Resnick's writerly stamp? If you don't feel you've had your money's worth out of it, that will be only because you finished it that quickly. It's that smoothly, eminently readable.

And now, if you love the prolific Mike Resnick's work and want to know more about it and him, be ye apprised that he has His Very Owne Fanne Clubbe. Or at least a fanzine. It's called *Resnick at Zineth,* and it's available from Doug Roemer, 674 Newbridge Court, Arnold, MD 21012. The first issue, which I received last March, features a black-and-white graphic story, "The Destroyers," which doesn't do a bad job at all of capturing Mike's approach.

In **The Kalif's War,** John Dalmas offers us a highly stratified society of

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greater and lesser nobility, gentry, and peasants, dominated by a religion that takes its scriptures as seriously as do our own fundamentalist Christians and Moslems, ruled by a parliament of sorts in which only prelates and nobles can vote, presided over by an emperor or Kalif. The time is many millennia hence, after humanity has spread among the stars, fallen to barbarism, and begun the climb again. The prophet Kargh apparently had some inkling of the heights humanity had once occupied, for the scriptures he wrote, which form the religious base of the Karghannik Empire, contain obvious clues and were confirmed in important ways when the people of his world went into space and found ten more colonizable worlds within reach.

At the time of the story, the Empire covers eleven worlds and is content to seek no more (Kargh said there were no more). The Kalif is a degenerate tyrant. Now comes Coso Biilathkamoro to assassinate the Kalif on behalf of the College of Exarchs and then—much to the exarchs' surprised dismay—to insist on being anointed the new Kalif. Meanwhile, an outworld of the Empire had sent an exploratory mission off into the depths of space, seeking more worlds to colonize and exploit. Now the expedition returns with reports of a Confederation of many worlds—more than the Empire's!—and inferior weaponry, although the soldiers were able enough to chase the expedition off. With them they have one prisoner, the woman Tain, who has lost all memory but remains, apparently through her racial differences from the Karghannik norm, a sexually compelling temptress.

News of the expedition's discoveries comes to the new Kalif, who is showing himself to be an intelligent, competent, and humane ruler. The idea of invading and conquering the Confederation is broached. Political opposition arises. The Kalif meets and is promptly obsessed with Tain. He marries her. The political opposition intensifies and his ideas grow more humane even as Tain seems to be regaining hints of memory, at least in her dreams. The Kalif becomes an outright reformer. And finally the opposition goes to a certain general to suggest a coup.

I won't say how it all turns out. I will say I was not nearly as satisfied as I was by *The Lantern of God*. Dalmas is playing here with that interplay of hidebound reactionary and progressive, of religious fanatic and secular pragmatic, of autocrat and democrat, of soldier and civilian, that defines a society. Indeed, he is doing much the same sort of thing he did with *The General's President*, albeit with less sense of the lectern or pulpit. That is, he's a utopian writer, an idealist who thinks he knows how to solve all the world's problems. (Or he wishes he did.)

One root of my dissatisfaction is that Dalmas makes it seem so easy, despite all the political complications. On the other hand, what else can an author do in one book? Another root, and I think a more important one, is the Kalif's wife, Tain, who has strange dreams and seems by her very presence to give the Kalif notions so strange that those around him wonder if he's getting a brain tumor. Is she more than she seems? Some strangely potent Confederation agent? There are hints that Dalmas may have planned to do more with her but for some reason did not. And such hints, when they lead nowhere, do bug me.

In many ways, S. N. Lewitt's **Blind Justice** is a very satisfying book. She posits an interstellar situation that grows

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quite naturally from what we have now. There is the dominant Justica, developed from the Soviet space program (with a hint of U.S. participation), smug, condescending, bureaucratic, controlling, given to declaring its economic and political dissidents criminals and relegating them to its equivalent of prison camps, long-haul interstellar spaceships. If the Justica deems a "criminal's" skills valuable, he or she gets a life sentence. Even without a life sentence, relativistic time-dilation keeps trouble-makers out of the way.

Then there's the world of Beau Soleil, rooted in Arianespace, Europe's version of NASA. This gives Lewitt the opportunity to make a suggestion that may be both original with her and intriguingly practical in a context of relativistic space travel. Here and now, the Academie Francaise—"one of the few eternals in the universe"—is famous for resisting change to the French language. Sometimes its efforts seem ludicrous. But such an institution may be essential for travelers—*voyageurs* akin in spirit to those who explored and exploited Canada—whose returns to Beau Soleil are decades apart and who require certain basic cultural stabilities in order to maintain their sanity. Add to this that the center of much of *Blind Justice*'s action is the city of Huit Fleurs, in the Quartier, a perennial *rive gauche* yeasty with political and artistic ferment, and you have Paris in the stars, full of romance and enchantment. Add to this Catholicism and the French "Rights of Man" heritage, and you have a culture that can not only recognize the personhood of artificial intelligences such as those that run Beau Soleil's starships but baptize them as well.

Now meet Emile Saint-Just, young apprentice to the Syndicat of star-traveling traders, assigned to the *Mary Damned* and her cargo of the drug sadece senin. The Justica has banned trade in the drug except under its extortionate auspices. The *Mary Damned* is about to run the blockade.

And of course the ship is nabbed. Emile winds up sentenced to the *Constanza* for ten years where he toughens and makes contact with Gorvitz, a member of the underground resistance. When he comes up for parole, Gorvitz infects him with a retrovirus developed by a medical fellow prisoner. Emile will be contacted later on, will give a blood sample, and that will be the end of it until the plague is unleashed on the Justica. In the meantime, apparently, the virus will give Emile certain benefits. I say "apparently" because this portion of the story seemed rather confused, as if the editor had told Lewitt that since she makes no use of these benefits later on, their introduction is not essential; sadly, then, Lewitt didn't finish the revision process.

When Emile returns to Beau Soleil, he finds the Justica ensconced and the Syndicat refusing to admit that he ever belonged to them. Reinstatement? Forget it, *copain*. Bugger off. Don't bother us.

Emile doesn't want to overthrow the Justica. He just wants what is his, and he knows it's there to be had, for the Syndicat's artificial intelligence, Claude, does recognize him. But he falls in with would-be revolutionaries and becomes something of a figurehead for the revolution. The rest of the story, except for its end, is then predictable.

Elizabeth Scarborough has shown an impressive level of talent with *The Healer's War; The Drastic Dragon of Waco, Texas; Nothing Sacred;* and more. In the process, she has shown herself capable of dealing with material

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both weighty and light.

What do you get if you pick up her latest, **Phantom Banjo?** In brief, something both light and weighty, and good as well. It's the opening volume of a new series, *The Songkiller Saga*. The premise is that the devils—presented as a pretty ecumenical bunch, though with a distinct tilt toward conventional Christian views—have decided that people take far too much comfort from the songs they grow from their pain. These are the songs of slavery and oppression, union songs, work chanteys, ballads, songs of social criticism and resistance and rebellion. In other words, folk songs. The devils would much rather that people have only mindless radio noise—rock and Muzak—to listen to. So the folk songs have to go. So do the folkies. The question is how to get rid of them.

As you've suspected for years, bureaucrats are in league with the devil. Scarborough shows us how a rigid, high-priced licensing scheme can destroy small gigs and turn small-time musicians into waitresses. Then there are the official view of folk singers as subversive, seditious traitors; the arrests on trumped-up charges; the plane crashes; the fire that destroys the folk music archives at the Library of Congress, news of which causes a famous folk singer, who has spent much of his life collecting material for the archives, to have a heart attack on stage. As he lies dying, he passes his banjo, Lazarus, to another and lesser musician. Before long, that musician too is dead, and Lazarus belongs to Willie MacKai, an alcoholic who had given up the battle and is now an ex-singer. But now Willie is wanted for murder, a demon tells him that as the musicians die the songs will be forgotten, and Lazarus prods him on by playing the sacred music all by itself. It is, perhaps, a memory of the music that the devils cannot touch.

The banjo is therefore a prime target. So is Willie. But Willie is with friends, and together they manage to survive all the devils can throw at them, including a very strange highway scene in which their station wagon is hemmed in on all four sides by massive, demon-driven trucks.

They survive, but do they win? The tale is told by one of the characters years later. She wanders from group to group in the lower echelons of our society—the homeless, kids, barflies—telling the tale wherever she goes, stressing that the devils are still there, that the songs must be remembered. She is in a way cultivating the music at its roots in just the way a certain song—brought back from beyond the grave by the phantom banjo—urges. Perhaps she is also saying that folk music is not the music of prosperous people, that prosperity robs us of our souls and leaves us fit only for pap. Certainly when prosperity merely hints at coming her way, she cuts and runs.

The next volume in the series could be quite interesting.

Dennis McKiernan has written a number of fantasies and achieved enough success that his publisher bills him as the "author of the best-selling series *The Iron Tower* and *The Silver Call*." I've seen the books, of course. I see *everything*.[2] As I recall, I reviewed the first of the *Tower* series and found it to be generic rack-filler.

I did not review any more of McKiernan's books for the simple reason that none of them struck me as being worth my time. They continued to look like rack-filler, pabulum for minds that fix-

[2]Well, not really. But I do see a *lot*.

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ated on Tolkien a generation ago, or—worse!—on one of the many, many Tolkien imitators that have arisen in the last thirty years.

Do you object that I am hardly being fair? Occasionally, I tell myself the same thing. I am judging books by their covers and their blurbs, without giving their authors a chance to convince me of the error of my ways. And I really should. . . .

It was therefore with a sense of some relief that I found **Tales of the One-Eyed Crow: The Vulgmaster** in the mail. It was accompanied by an impressive drumroll from the ROC publicity department—"Pioneering format! Sure to create a buzz among the science fiction community!"—and it looked like a quick read. After all, that "pioneering" format looked like nothing other than a pretty standard graphic novel, with the artwork by comics illustrator Alex Nino.

So I read it. The book is set in Mithgar, the same fantasy world McKiernan created for his best-selling series. There are hobbitoid Warrows, dwarves, elves, and men who can change into bears. There are orc stand-ins called vulgs and wolfish rucks. There is Baron Stoke, who loves to flay men and elves and Warrows alive and who has just captured a family of traveling entertainers, all but young Tom, rescued by an elf maid and still alive as the gaffer who tells the tale in an inn called the One-Eyed Crow. There is a rescue expedition, Tom, maid, and the bearish Urus. There is success, albeit not total success.

There is also careless language (e.g., "elfinlike"[3]), appallingly trite dialogue, and still another round of flagrant exploitation of a classic.

[3]Which can translate only as "elf-like-like."

Ah, well, it could be worse. And sometimes it is. I have in front of me a thing called **Fatal Exposure,** by Michael Tobias, whose blurb says: "Above the Arctic Circle a hole in the ozone layer has begun drifting southward, letting in a shower of sunlight and heat—sun that blinds, heat that kills. . . ."

That's not very enticing. Yes, there's a hole in the ozone layer, and yes, it offers our future a serious hazard, but not because it's going to let in solar heat. The problem is that component of sunlight at the other end of the spectrum, ultraviolet light, which can cause skin cancer and cataracts, decrease crop yields, and do a few other nasties.[4] But it won't cook us or set the world on fire. Saying it will, even in fiction, does us all a disservice, for it makes it too easy for the complacent to belittle the problem, saying, "It ain't *that* bad, is it?" To which, of course, even the most fanatical of environmentalists must answer, "Well, no, but. . . ." and thereby weaken our sense of a quite genuine danger.

Fatal Exposure belongs to a classic SF subgenre—end-of-the-world disasters. I wish that it did not tell us that Pocket Books completely lost its sense of what SF should be when it got rid of David Hartwell and his Timescape line.

Regional publishers specialize in material of regional interest, but sometimes their titles are worth noting for the larger audience. A case in point is Pineapple Press' **Anthology of Florida Science Fiction,** edited by Rick Wilber

[4]You say the scientists are predicting that things will warm up? That's not the ozone hole, though. It's the greenhouse effect, and some of the same industrial chemicals contribute to both it and the ozone hole. But it's not the ozone hole.

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and Richard Mathews and designed to "show how integral Florida has been to the field." The emphasis is on writers who live or have lived in the state and on stories set there. Water looms large in pollution, drying swamps, and rising sea levels. There are funky aliens, deserted cities, parakeets, porpoises, moonshiners, and plenty of classics. Piers Anthony is here with "Beak by Beak"; Andre Norton with "Desirable Lakeside Residence"; Walter M. Miller, Jr., with "A Triflin' Man"; Joe Haldeman with "All the Universe in a Mason Jar"; Damon Knight with "Down There"; and Kate Wilhelm with "The Scream." Other contributors include Joseph Green, Martin Caidin, Jack C. Haldeman, Charles Fontenay, and editor Wilber. Clark Perry's "Killing Time" got in by winning a competition for novice writers judged by Joe Haldeman; it is quite professional in execution, and its vision of a world into which strange "portals" have intruded has a certain kinship with Robert Reed's *Down the Bright Way*.

Nebula Awards 25, the last of these annual volumes to be edited by Michael Bishop, is once more an excellent addition to any library, personal or public. It collects those stories judged the best of 1989 by the membership of the Science Fiction Writers of America, Inc., together with Ian Watson's pungent commentary on the year's novels, Bill Warren's remarks on the films, a fascinating essay by Orson Scott Card on metaphor, literary dialects, and the literary versus popular debate, a Nebula satire by Paul Di Filippo, and Damon Knight's words on "What Is Science Fiction?" Elizabeth Ann Scarborough provides an excerpt from and an essay on her winning novel, *The Healer's War*. There are also the three poems—Robert Frazier's "Salinity," Bruce Boston's "In the Darkened Hours," and John M. Ford's "Winter Solstice, Camelot Station"—that won the Science Fiction Poetry Association's Rhysling Award. ■

●There are more fools than wise men, and even among the wise there is more stupidity than wisdom.

S.R.N. Chamfort

●If women are expected to do the same work as men, we must teach them the same things.

Plato

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brass tacks

Dear Dr. Schmidt,

I read with interest your editorial in the January 1991 issue. As usual, you have skillfully dissected a difficult issue, making it more amenable to focused discussion. Readers interested in more information about the right to die with dignity and free will intact, may wish to contact The Society for the Right to Die or Concern for Dying. They publish an informative newsletter and testify in key court cases. Both organizations have their offices at 250 West 57th Street, New York, NY 10107.

SCOTT FINLEY, MD, MPH
Framingham, MA

Dear Dr. Schmidt,

I find the idea of a right to die frightening. I wonder how hard heirs and insurance companies are going to work to coax, frighten, and shame me into doing the "right" thing and take advantage of my right to die, rather than spend a lot of money on a thousand to one shot at a cure, or even make my last days more comfortable.

As for Dr. Kevorkian, I think charging him with first degree murder is a bit harsh. Mercy crimes, such as aiding a person to commit suicide, should be punishable with a stiff fine and/or maybe a short jail sentence and, in a doctor's case, perhaps suspend his license for a while.

DAVID E. RUBIN
57 Floyd Street
Staten Island, NY 10310-2255

The issue is not the right to die, *but the right to* choose. *My objection was to any "right" which any group tries to force people to exercise.*

Dear Herr Doktor Schmidt:

Jahwohl [sic], mein herr Doktor! No one should be at all deterred by cries of

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"Genocide," when everything possible is done to eliminate "superfluous," and "excess" population, especially in those "developing" countries whose peoples are, after all, black, brown, yellow, or otherwise "inferior" to the white race. (February editorial, "Say When!) No one owes anything to those who, as you so aptly put it, "do not have to exist."

One must recall the wonder work done by those of your philosophical position at such places as Auschwitz, Dachau, and those other fine examples of works that gave proper Lebenstraum, eliminated "inferior" breeds, and so marvelously showed the way. They achieved a great goal, and managed to lower the population of Europe by something over six million. Of course, these fine accomplishments were made in spite of the cries of "Genocide," which these leaders did not at all allow to "intimidate" them in their efforts. These leaders also gave foremost example of not owing anything to those who, as you have so rightly expressed it, "do not have to exist." They wiped out, forever, the possibility!

There are, of course, those misguided souls who might argue that these fine examples of the best of your philosophical persuasion also wiped out, or eliminated, the possibility of another Einstein, Mozart, or other individual of genius and great potential. But, this after all merely gives rise to emotionalism. Those who "do not have to exist" need not exist; so the possibility of someone of great genius or potential is, merely, moot. And, in keeping with your philosophical persuasion and that of the great European exemplars cited above, highly unlikely that anyone of stature would show up here to begin with.

So, mein herr Doktor, those of your philosophical persuasion must certainly *not* be "intimidated," by anything so trivial as the idea of "Genocide," when doing their best to implement the fundamental propositions they hold. Those who "do not have to exist" in the first place are not really, as you point out, truly objects of "Genocide" when their existence is, merely, prevented. You are both semantically and philosophically correct in your exposition.

And, of course, who better to "selectively reduce birth rate" than the devoted proponents of your philosophical, and semantic, persuasion and position? I do envy you, mein herr Doktor! Having been selected to play the part of "Almighty God" in such decisions has put you into the glorious pantheon of Hitlers, Eichmanns, Mengeles, and others who did their best in the Thousand Year Reich to implement that "population control" so necessary, so desireable, and so absolutely right for man.

COLIN J. GUTHRIE, PH.D
Aurora, CO

This is precisely the sort of outburst I had in mind when I warned (in my February editorial), ". . . any time you talk about selectively reducing the birth rate in some geographic areas you will be confronted with violent shouts of 'Genocide!' But you must not be intimidated by the word, for it is being misused. . . ."

So I now repeat, and I shall elaborate. You are welcome to disagree with what I say, but please do not *put words in my mouth! For instance. . . .*

I did not say or imply a thing about eliminating any population that already exists, or that anyone who already exists "does not have to." I certainly didn't (and wouldn't) say or imply anything about "white superiority"—and I can't help wondering why you *felt*

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obliged to drag in the irrelevant matter of race. And your "European exemplars" are not even remotely of my philosophical persuasion. I find their actions at least as odious as you do, partly because they really did preach racial superiority and practice genocide.

Genocide is "The use of deliberate, systematic measures such as killing, bodily or mental injury, unlivable conditions, prevention of births, calculated to bring about the extermination of a racial, political, or cultural group or to destroy the language, religion, or culture of a group." (Webster's New International Dictionary, 2nd Edition) *Some other dictionaries define it more narrowly, but what I described is nowhere close to even this broad definition. It does not suggest the elimination of* any *group or culture. It does not necessarily involve any reduction in numbers, and certainly no* disproportionate *reduction in numbers. It suggests only a reduction in* rate of growth, *for the express purpose of improving* all *races' and cultures' long-term viability.*

Sooner or later every *group will have to cut its reproductive rate back to a sustainable level, if it is not already there. Very few* are *already there; so eventually, if not now, almost everybody will have to slow down. It is simple arithmetic that those groups farthest above a sustainable rate will have to do the most cutting back to achieve stability (though in some cases what is sustainable can be increased by improving technology).*

As for your argument about potential Einsteins, every *possible birth represents a potential Einstein (or Hitler, or Al Capone). Yet many possible births* must *be prevented, in* every *culture, simply because it isn't possible to support all the bodies that would exist if they all were allowed.*

So . . . you don't like my suggestions. Do you have any constructive *ones of your own? Or do you deny that a problem exists?*

Dear Stan:

I must take issue with three points you raised in your February editorial, "Say When!" The first two have to do with abortion. (Quick, everyone, duck!) First: *Opposing abortion does not imply that one advocates "having as many children as possible."* This is a logical fallacy, independent of which side one chooses in either debate. Abortion opponents believe that it kills an unborn human child. It is possible to believe this and also believe that family sizes should be limited.

#2: Even abortion proponents do not couple abortion to population control. *For purposes of population control, only abortion of females is effective.* Males are largely irrelevant to population growth; mathematically, there need only be "enough to go around." (Sorry, guys, but that's the way the matrix mumbles. How many is "enough" I will leave as an exercise for the reader.) A village with fifty females can have at most fifty pregnancies a year, whether there are five men or five hundred. Males become a factor in population growth only to the extent that a society emphasizes faithful, monogamous marriages, a meme-set not currently in vogue in our own society.

Low-tech societies know how to maintain stable populations. There has been quite enough time for the San Bushmen to have filled the world, yet they have not done so. Infanticide being safer than abortion for low-tech others, we see the evidence in the mortality table for infants and children. "Excess female mortality" has been documented from the Arctic to the Tropics. Expo-

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sure to the elements has been the preferred method; but overlaying, neglect, and overwork are also popular. The Japanese term for the practice is *mabiki*, meaning "to thin out the crop." The Tikopians in the South Pacific have the charming custom of burying live baby girls in the earth and covering them with stones. Pre-industrial societies often have female:male mortality ratios of nearly 2:1 up to age five ("very late term abortions") and the ratio does not become even until about age ten. Our own so-called sexist society at least does not kill little girls out of proportion. (Being denied equal pay for equal work and seniority is certainly reprehensible, but it is not in the same league with being worked to death like an animal when you're under ten years old, as in 1834 rural England.) It remains to be seen if sex typing in high-tech societies will lead to similar sex ratios among aborted fetuses. (Are figures even kept on this statistic? Why not?) Melvin Konner has an essay on this in his book, *Why the Reckless Survive* and I believe you also raised the issue in an earlier *Analog* editorial.

Which brings us to Point #3. (Actually your main point.) Is population growth really a problem? (Gasp! Heresy!) In *The Population Bomb*, Paul Ehrlich predicted massive, worldwide famines by 1970, and recommended Global Triage. Write off countries like India, that were already lost causes! No more foreign aid. (Translation: "I got mine, Jack.") It didn't happen, of course. The local famines that did take place were due to local disasters, like drought, civil war, or socialist governments. Does this mean there is no problem?

Certainly populations cannot grow without end. But in fact they do not; and not because of the Four Horsemen. Human societies stabilize their population to the local carrying capacity through a combination of restricted breeding privileges and infanticide/abortion. We see this, for example, in surviving hunter societies, such as the Kalihari Bushmen. In fact, from −10,000 to −5,000, world population was static, growing from 4m to 5m people. This was the hunter/gatherer carrying capacity.

During the 1st Population Explosion (Agricultural Revolution), humanity doubled four times between −4,000 and −500; the last time between −1,000 and −500. After this, the growth rate began to level off: up only 70% in the next five centuries and barely at all after that. Population size (190m) had reached the agricultural carrying capacity of the environment. Agriculture supports far denser populations than hunting; although the hunter views the drab, regimented life of the farmer with horror (cf. Rousseau's "noble savage").

During the next 900 years, population did not quite double. A bubble in the curve corresponding to a climatic optimum burst when the climate crashed in a series of crop-destroying rains, followed by famine and the Black Death. (Ah, Dr. Malthus, how nice of you to drop in!) BUT: was the die-off "caused" by population growth or by climatic change? Is it the bell that rings or the clapper?

During the 2nd Population Explosion (Industrial Revolution), humanity doubled between +1,400 and +1,750; then doubled again in just over a century. It was at this point that European population (and technology) began outpacing China—up 115% during the 19th century! According to the Population Bombers, this should have been catastrophic for Europe. Instead, com-

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fortable, well-fed Europeans dominated the world. The curve is still headed up because we have not yet reached the new carrying capacity of the environment. Industry supports far denser populations than agriculture; although the farmer views the drab, regimented life of the urban worker with horror (cf. Chaplin's *Modern Times*).

The West boomed in the 19th century *because death rates plummeted*, not because birth rates rose. More children lived long enough to become parents themselves. Birth rates fall later when a society becomes wealthy and technologically advanced. In the US, they have been falling at least since 1820. Even the *peak* of our Baby Boom was lower than the turn of the century rate. The West is now *below* ZPG levels (though the Boomer cohort passing through its child-bearing years will blow a bubble.) In fact, birth rates have been dropping since WWII everywhere *except* sub-Saharan Africa, where they have remained steady (*Scientific American* [May 1990]).

The Netherlands comfortably sustains 433 people per square kilometer, while Ethiopia struggles with 38. So, population alone is not the problem. The problem is population growth *without* technological growth. Africa may well become an Ireland writ large. The Irish doubled and redoubled their numbers; but the English would not permit industry in their colony. So, the population finally exceeded the (agricultural) carrying capacity. But this "Malthusian" disaster was largely man-made, as evidenced by the refusal of the English government to provide aid and the fact that English landowners in Ireland continued to export food to England during the course of the Great Hunger.

The African parallels are extremely disturbing: Explosive growth coupled with a colonial legacy hostile to industrialization. And anti-industrialists (mostly Western) continue to discourage Third World modernization decades after the colonialists bailed out. Is the issue really that Africans should be less prolific because they were not permitted a native industry? It is all well and good to say they should maintain their native cultures and pristine environments; but is it only an incidental spin-off that this policy would ensure that they never become competitive rivals to The West?

I do ramble on. I'm sorry this letter is so long, but to quote Pascal, I didn't have time to make it shorter.

MICHAEL F. FLYNN

It's true that there's no built-in logical connection between opposing abortion and opposing all forms of population control, and I thank you for making that explicit (though I don't believe I ever denied it). However. . . .

1. The fact remains that opposing abortion No Matter What, *and offering no suggestions as to what can replace the role that it currently plays as one of several means of population control, has the* effect *of ignoring the larger problem. And there are some people—a subgroup I described as "extreme"—who* do *oppose all forms of population control.*

2. Some abortion and choice proponents (which are not the same thing) don't couple abortion to population control—but some do. Certainly demographers do. If statistics I've seen in numerous sources are at all reliable, abortion does currently play a significant role in population control. That is, if all the abortions that now happen were prevented and nothing else changed, birth rates would rise significantly. As you say, abortion of males has little effect, but half of those that occur are females and those are *effec-*

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tive. This merely means that aborting indiscriminately is inefficient and wasteful as a means of population control. That's one of many reasons why I view it as a last resort and would prefer to see it completely replaced by methods which are both more efficient and more humane. (Needless to say, I don't consider selective infanticide an improvement in terms of "humane.")

3. According to the most recent source I have at hand (the 1988 Britannica Book of the Year*) only a few western countries were actually below ZPG levels. (Most were slightly above.) As I said in the editorial, decisions about what level is "comfortable" are partly matters of taste; some like crowds, some like elbow room. You mention the Netherlands; I've been there, and found it in many ways a delightfully and admirably civilized country—but it's an almost completely artificial environment. I personally would be seriously bothered by the lack of variety if the whole world were similarly developed. Which of us are "right"—or should some effort be made to accommodate both kinds of preferences?*

On one point I very much agree with you: the African parallels are disturbing. Some places could *sustain larger populations than they do,* with appropriate technology, *and the world would probably be a better place if they were encouraged to do so. (The historical example of the West suggests that the population would then tend to stabilize at a level which would be higher, yet better off.) Crucial corollary question: who is responsible for making that happen, and how should that responsibility be exercised?*

Dear Stan,

Although I have a gut feeling that hydrogen fuel may indeed prove an Earth-saver, Marc Davenport (February issue) can't be allowed to get away with the claim that it is a "squeaky clean" fuel. The exhaust product is chiefly water vapour. Water vapour is a greenhouse gas par excellence, so widespread use of hydrogen fuel could increase global warming. On the other hand, the vapour may not persist long in the atmosphere before being converted into water droplets. Water droplets make clouds, and depending on the size of the droplets and cloud altitude, they must either trap more heat or reflect away incoming solar energy, cooling the globe. It would be an extraordinary stroke of serendipity if there were no net effect on climate!

Which just goes to show how easy it is to fall into the trap of wishful thinking.

JOHN GRIBBIN

Dear Dr. Schmidt,

I am writing to commend you for the timely publication of Marc Davenport's "Hydrogen Time" article.

I thought he did an effective job of laying out the various potential applications which hydrogen can accommodate.

I would like to suggest yet one additional possibility, however, which I have been thinking about for some time. I wonder whether it might not be possible to set up a plant which would generate electricity by using convection to create an artificial wind. The problem with wind turbine generators is that they are now limited to operating on sites where there is a more or less constant wind flow. My proposal would be to construct large stacks which could be used to channel air flow that would spin wind turbines. I would drive these turbines by using the raw heat from the Sun which would heat the air at the point where it

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flowed into the stack. I would be able to run the process 24 hours a day storing heat in a liquid medium which I would use during the hours when solar energy was not available.

Adopting such an approach would make it possible to extract energy from moving masses of air in any location where there was sufficient sunshine to drive the process.

A number of cities in California are having to build plants to desalinate water because of the prolonged drought there which shows no sign of ending this year. These plants require large amounts of energy which has to be produced somehow. Hydrogen extraction done with a solar driven plant would produce pure water as a byproduct, and the hydrogen could be burned to produce more heat, etc.

I would be interested in hearing reactions to this idea from any *Analog* readers who might like to write to me. I will answer any letters I get on this subject, but there may be some delay because I am blind, and I have to wait until I can find somebody to read my mail each week.

I think *Analog* is the best magazine that the Library of Congress produces for the blind and others prevented from reading because of physical handicaps. Keep the good stuff coming.

HARV ROBINSON
Route H. C. 268 BX 750
Inez, KY 41224

Dear Stan:

I noted in the first letter in Brass Tacks (April '91) that William Tenn is referred to as "the late Mr. Tenn."

The reports of his death are greatly exaggerated. When last heard from, he was uncomfortable, but reasonably well. Does his having reached retirement age give rise to such rumors?

VIRGINIA KIDD ■

●Despite vaunted powers of speech and consciousness, our kind's great cultural adventures remain tethered to the mundane conditions imposed by our specific humanity. If somewhere in the universe there are intelligent armor-plated asexual social creatures made of silicon who are energized by photovoltaic receptors and reproduce by fission, I am sure that they are given neither to painting reindeer on cave walls nor to pushing carts up and down the aisles of supermarkets.

Marvin Harris, *Our Kind*

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a calendar of analog upcoming events

29 November-1 December
LOSCON 18 (Los Angeles area SF conference). Info: LASFS, Inc., 11513 Burbank Blvd., North Hollywood CA 91601. (818)760-9234.

29 November-1 December
SILICON 91 (San Jose area SF conference) at the San Jose Red Lion Inn, San Jose, Calif. Writer Guest of Honor—Steven Brust, Artist Guest of Honor—Darrell Sweet, TM—William Shetterly. Registration—$35 until 1 November, $40 at the door. Info: Silicon '91, Box 8029, San Jose CA 95155-8029. (408)977-0562.

29 November-1 December
VISIONS 91 (Chicago-area media SF convention) at Hyatt Regency O'Hare, Chicago, Ill. Guests—Mary Tamm, Paul Darrow, Gareth Thomas, Brian Blessed, Michael Praed, Timothy Zahn, Frederik Pohl. Registration—$45 until 15 November, $50 thereafter. Info: Her Majesty's Entertainment, Box 1202, Highland Park IL 60035. (708)405-9461.

6-8 December
TROPICON 10 (South Florida SF conference) at Ft. Lauderdale, Fla. Guest of Honor—Andre Norton. Info: Tropicon 10 % SFSFS, Box 70143, Ft. Lauderdale FL 33307.

13-15 December
SMOFCON 8 (SF convention runners' conference) at Shilo Inn, Portland, Ore. Info: Smofcon 8, Box 5703, Portland OR 97228. (503)774-7592/283-0802.

3-7 September 1992
MAGICON (50th World Science Fiction Convention) at Orange County Civic & Convention Center, Orlando, Fla. Guest of Honor—Jack Vance; Artist Guest of Honor—Vincent Di Fate; Fan Guest of Honor—Walter A. Willis. Registration—$85 adult/$45 child until 30 September, Supporting—$25. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competion—the works. Join now and get to nominate and vote for the Hugo Awards and the John W. Campbell Award for Best New Writer. Info: MagiCon, Box 621992, Orlando FL 32862-1992 (407)275-0027. UK agent Peter Weston, 72 Beeches Drive, Erdington, Birmingham B24 0DT UK.

29 October-1 November 1992
WORLD FANTASY CONVENTION at Callaway Gardens, Pine Mountain, Ga. Limvance. Info: World Fantasy Convention '92, Box 148, Clarkston GA 30021. (include SASE)

Note: when writing to any convention for information, it is always polite to include a large self-addressed stamped envelope (SASE).

—Anthony Lewis

Items for the Calendar should be sent to the Editorial Offices six months in advance of the event.

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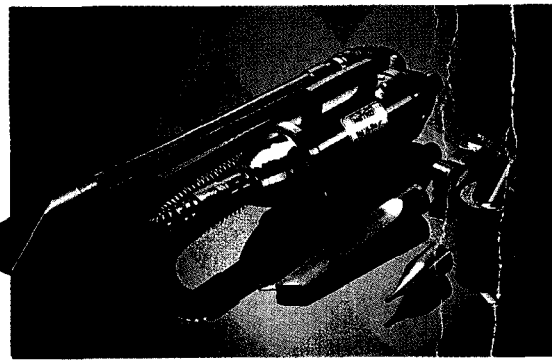

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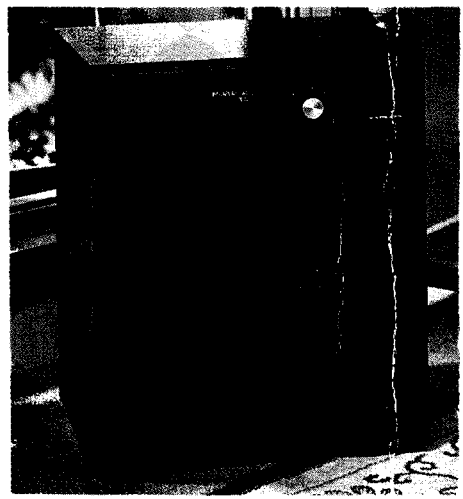

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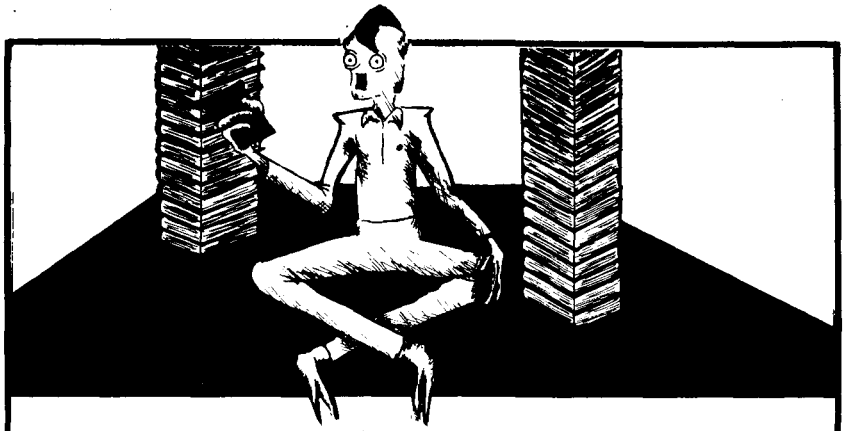

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